Transformation of individual academic knowledge into a competent organization
A case study in a software house

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Developing a customized framework for translating knowledge into practice **in an IT organization using People CMM**

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Abstract

The software industry is able to attract the best talents of this world but faces the daunting task of nurturing their precious treasure, their people. To remain competent, the workforce should be agile such that the organization is able to deal with change which is an integral part of software development, be it language, platform or architecture.

There are many ways that can be adopted to constantly upgrade the knowledge level of the employees who are involved in the development and maintenance of software. One of the ways is to acquire academic knowledege through studying in a university. There is, however, a chasm that lies between the acquired academic knowledge and its transformation into a competent organization. In order to understand why this gap exists and how People CMM (P-CMM) can be applied to achieve transformation of individual academic knowledge into a competent organization research was conducted in the Softwarehouse of ISC.

Through the initiative of professionalizing through the Open University (OU) of The Netherlands every employee of the Softwarehouse was offered an opportunity to study through the Open University to enhance or upgrade their academic knowledge and skills. The Softwarehouse was found to be suitable for the purpose of this study owing to the fact that it involved garnering of individual academic knowledge (through OU) with the objective that it would eventually lead to a competent organization.

The selected population was divided into a target group (employees following a study at the OU) and a control group (Not OU, employees not following a study at the OU). Besides this, the population was also divided on the basis of the level of work. The research instruments were developed on the basis of P-CMM and theoretical research on legacy systems and Knowledge Management. Survey, interviews and focus group discussion were used as the means of primary data collection.

As a result of the analysis of data and input from theoretical research this thesis proposes a model of transformation of individual academic knowledge into a competent organization and provides recommendations for the case organization.

Index terms : Softwarehouse, People CMM, Academic knowledge,
Organizational competence, legacy applications, OD Interventions.

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1. Introduction

Dependency on software in today's world is increasing with every minute. The knowledge intensive organizations that are into the business of software are increasingly dependent on the soft side, their employees to drive their hard financial numbers. Those organizations that want to remain competitive, invest in the human capital constituting them. To keep pace with the changing environments of the IT world, in many cases organizations invest in educating their employees. Often employees are offered highly focused short courses to upgrade their knowledge, but seldom organizations choose to undertake a journey like the one chosen by Softwarehouse of ISC.

1.1 Project context

ISC (ICT-Service Centrum Politie, Justitie en Veiligheid U.A.) is the information and communication technology (ICT) supplier for the law enforcement and security chain in The Netherlands. ISC specializes and focuses on effective, reliable and befitting ICT solutions for the police, the judiciary and their partner organizations in the law enforcement and security sectors.

The mission of ISC is to deliver secure and reliable IT solutions for police departments, fire departments, ambulance operators, and their partner organizations.

ISC builds and upgrades computer networks and applications. This enables ISC to create a single, homogeneous national infrastructure and a single uniform set of applications. Co-operation; a high service level; and a professional pragmatic approach are important key words that guide ISC in contributing to make The Netherlands a safer place.

This research has been conducted within the context of the Softwarehouse. The Softwarehouse is a department within the production division of ISC which is called Promenens. The Softwarehouse has a full time equivalence (fte) of 240 employees and provides services that can be divided into development; maintenance; and advice. It develops new software; upgrades existing software; in addition to providing application and functional maintenance. The Softwarehouse caters to its clients through providing consultancy with reference to ICT solutions.

1.2 The case

In February 2006 Softwarehouse started with the initiative of professionalizing its personnel through the Open University (OU) of The Netherlands. Within this initiative every employee of the Softwarehouse was offered an opportunity to study through the OU to enhance or upgrade their academic knowledge and skills. The only criteria for selection were employee's interest and the willingness to devote fifty percent of own time into the chosen study. Based on employee's interest and (existing) position within the organization, tailor-made study programs were created for the employees who were allowed to select the study of their choice. As a result, the selected study varied from a single module to full fledged master degree.

Study through the OU is the means and not the end for the Softwarehouse in its endeavor to professionalize. Expected time span of the initiative of professionalizing is 4 years. However, since the employees have been allowed to choose their own pace, the actual time taken to finish individual study varies from one employee to another.

Figure 1.1 depicts some of the environmental factors that the Softwarehouse has to deal with.

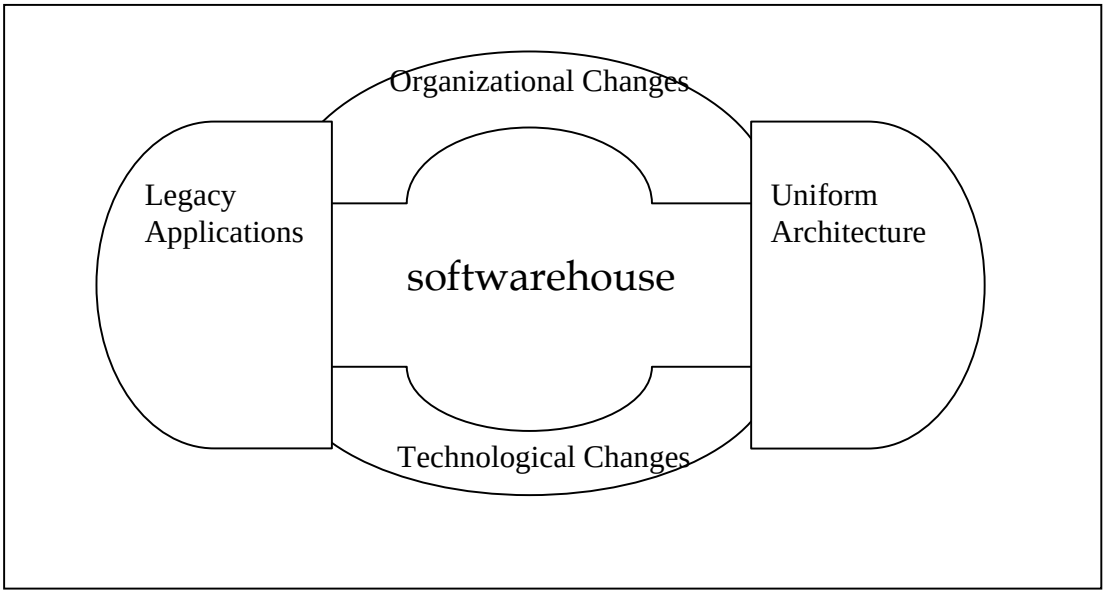

Figure 1.1: Project Context

On one hand Softwarehouse needs to honor its commitment to support the so called legacy applications and on the other hand it wants to move to uniform architecture. Softwarehouse also has to deal with organizational and

technological changes. Besides this, considering the investment being made in educating its employees it is imperative for Softwarehouse to ensure that the attained individual academic knowledge is also transformed into organizational competence. Another perspective to this situation is that of the employees, who after having increased their level of academic competence, have to deal with legacy applications owing to unique functional or technical knowledge. Moreover, it would be unfortunate if the organization fails to optimally utilize the available talent.

1.3 Research objective

This thesis moulds a well known framework, People CMM (P-CMM) to provide Softwarehouse with a road map to meet the challenges that Softwarehouse faces in transformation of individual academic knowledge into organizational competence.

This thesis is based on the assumption that since P-CMM framework leads to agile and competent organizations; its application to the specific subject of transformation of individual academic knowledge would also contribute to organizational competence. In this study an attempt has been made to apply process areas from two process threads of P-CMM *viz*. developing individual capability and motivating and managing performance. Additionally, subject Knowledge Management; and issues regarding legacy applications have also been considered owing to the organizational requirements.

Lastly, the research provides recommendations and a customized framework for transformation of academic knowledge into organizational competence based on the case study of OU track within the Softwarehouse, P- CMM and Knowledge Management.

1.4 Chapter overview

This thesis makes a contribution to the body of knowledge around transformation of individual academic knowledge to a competent organization from people's perspective.

In Chapter II the research framework is described covering the issues of adopted methodology, criteria for selection of process threads from P-CMM, criteria for selection of sample population, the research issue and the scope of this research.

Chapter III presents a theoretical overview and an assessment of the lessons learned from P-CMM implementations. This is relevant because this research is based on P-CMM and the likelihood that the lessons learned in P-CMM implementations could also be applicable to the customized framework is high.

In Chapter IV issues in the management of legacy systems are theoretically examined. This is relevant in the context of Softwarehouse as it faces the challenge that it is committed to support the legacy applications but at the same time the employees who are following the OU track need to be provided with the opportunity of working with new products.

In Chapter V interventions in organizational development and change are theoretically examined. In this chapter an attempt is made to establish which intervention strategy and organization can be utilized while implementing the customized framework. The focus has also been to identify facilitation strategies; moderators; outcomes of upgrading/retaining and transfer of skills/ knowledge.

In Chapter VI theoretical examination of the role of Knowledge Management in P-CMM is presented. This examination is important to this research as the primary objective of the research revolves around knowledge. Besides this, the concepts in Knowledge Management can be used as input for the design of the research instrument.

In chapter VII analysis of primary data collected through the interviews and surveys has been provided.

In chapter VIII a customized framework for transformation of academic knowledge to organizational competence is suggested.

Chapter IX provides my contribution to theory and practice through conclusions and recommendations drawn from the findings of the research in the thesis.

Lastly, limitations of this research and the scope for further research have been presented in chapter X.

2. Research framework and methodology

Presently Softwarehouse is engaged in implementing Application Service Library (ASL) for managing application development and maintenance (Pols, 2006). ASL is focused on the applications and does not provide for best practices for improving the competence of the work force. P-CMM on the other hand is constructed from workforce practices and process improvement techniques that have proven effective through application in many organizations (Curtis, Hefley, Miller, 2001). Across the maturity levels are process areas that can be relevant for converting acquired knowledge into practice. This makes P-CMM suitable for being used as a basis of research.

Within this research P-CMM has been used as the basis to chart the path that Softwarehouse can follow in its endeavor to facilitate transformation of individual academic knowledge into a competent organization.

This thesis assesses the current methods and practices within the Softwarehouse associated with transformation of academic knowledge into work practice. This thesis also examines the opinion of the management and the employees in terms of the bottlenecks faced and the available possibilities in increasing the competence of employees. As a result of this research the process areas of P-CMM that can be utilized to tackle the challenge of converting individual academic knowledge into work practice have also been identified. Literature review has been used to identify critical success and failure factors in management of legacy applications. The role of Knowledge Management systems in facilitating transfer of knowledge and in P-CMM implementations has also been analyzed. Through a combination of theoretical review of literature and empirical research, organization development intervention strategies have been identified which could be utilized, should the suggested recommendations be accepted.

The various steps undertaken during the research can be visualized through the research model presented in figure 2.1.

Research model

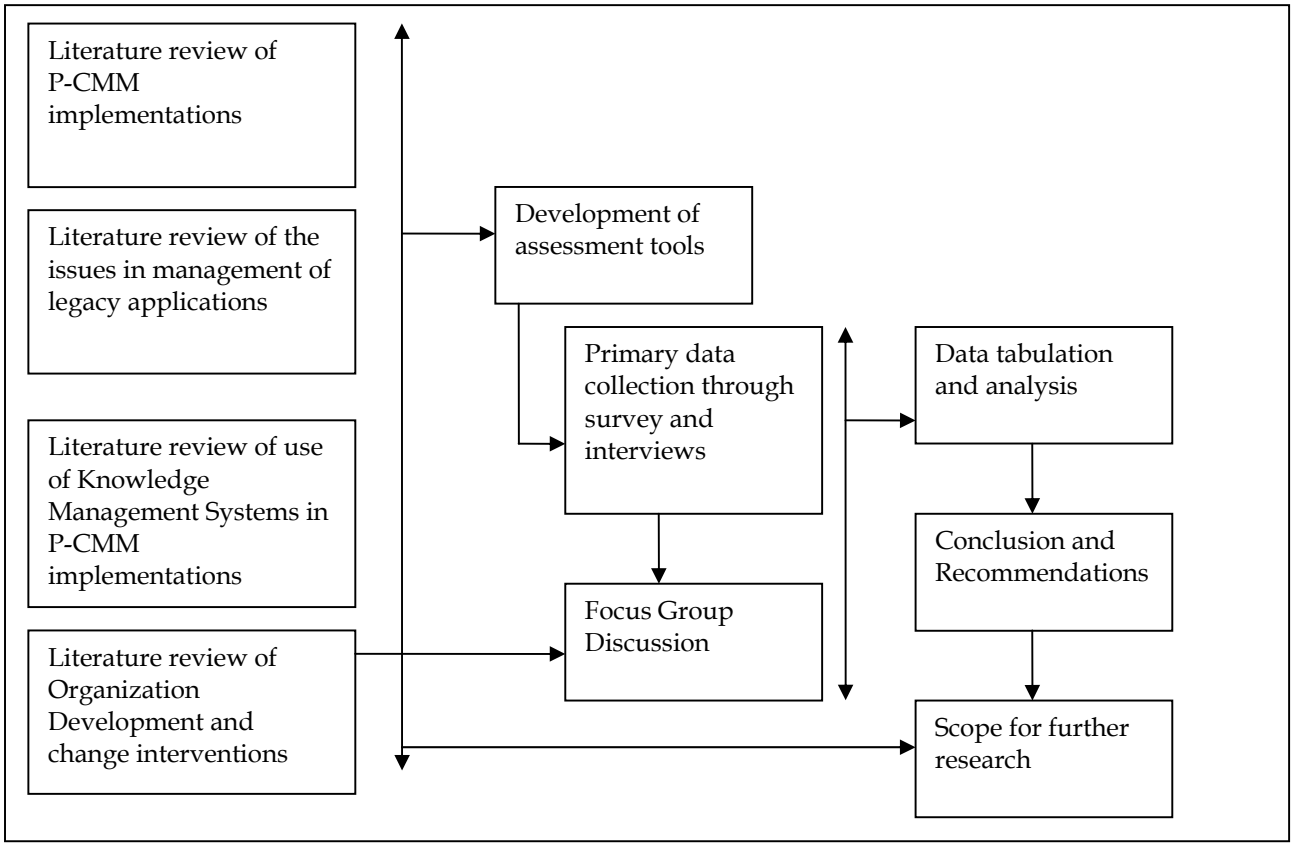

Figure 2.1: Research Model

The OU track of the Softwarehouse is the actual case that has been studied. Besides this, the context of commitment to support legacy applications, technological and organizational change has also been taken into consideration through theoretical research. The role of Knowledge Management systems in P-CMM has also been looked into based on theoretical research.

The primary data collection has been done through survey of the employees, through interviews and focus group discussion.

The sources of information that were used for this research have been tabulated in Table 2.1

Source		*Execution*
People	Employees following OU track Employees not following OU track Select group employees Select group management	Intranet Survey Intranet Survey Individual interviews Focus group discussion
Documents	Strategy documents Books	Content analysis Library
Media	Internet Intranet ISC	Search Engines (libraries, google), Content analysis Content analysis

Table 2.1: Sources of Information

Based on the data analysis and OD intervention strategies the focus group discussion was carried out to arrive at solutions and suitable intervention options for the challenges that are faced by Softwarehouse. The conclusions and recommendations have been based on data tabulation and analysis.

Based on empirical research and theoretical review scope of further research has been identified.

2.1 Research methodology

This research makes use of the P-CMM as the basis for identifying how individual academic knowledge can be transformed into a competent organization. The P-CMM's primary objective is to improve the capability of the workforce. Workforce capability can be defined as the level of knowledge, skills, and process abilities available for performing an organization's business activities. Workforce capability indicates an organization's readiness for performing its critical business activities, likely results from performing these business activities, and potential for benefiting from investments in process improvement or advanced technology (Curtis, Hefley, Miller, 2001).

The conceptual structure of the P-CMM is a matrix that crosses the primary areas of concern in managing the workforce with the organizational transformations associated with the maturity levels. The areas of concern constitute objectives that the P-CMM was designed to address (Curtis, Hefley, Miller, 2001).

Within this research it was chosen to focus on two of the four process threads namely Developing Individual Capability and Motivating and Managing Performance from the conceptual structure of P-CMM. The basis for selection of

the process threads was the usability of the process areas within the area of concern from the perspective that they can be applied from the individual towards the organization and can eventually lead to a competent organization. The maturity levels 4 and 5 were considered too high in comparison to the existing levels of the Softwarehouse and have been omitted in this research, with the exception of Mentoring which was thought to be of particular relevance for spreading of acquired academic knowledge. The specific process areas that have been investigated in the research are Mentoring, Competency Development, Competency Analysis, Training and Development, Competency Based Practices, Career Development, Compensation, Performance Management and Work Environment.

The conceptual matrix of P-CMM is shown in Figure 2.2

Maturity Levels	**Process Area Threads**			
	Developing Individual Capability	**Building Work Groups and Culture**	**Motivating and Managing Performance**	**Shaping the work force**
5 **Optimizing**	**Continuous Capability Improvement**		**Organizational Performance Alignment**	**Continuous Workforce Innovation**
4 **Predictable**	**Competency Based Assets** **Mentoring**	**Competency Integration** **Empowered Workgroups**	**Quantitative Performance Management**	**Organizational Capability Management**
3 **Defined**	**Competency Development** **Competency Analysis**	**Workgroup Development** **Participatory Culture**	**Competency Based Practices** **Career Development**	**Workforce Planning**
2 **Managed**	**Training and Development**	**Communication & Coordination**	**Compensation** **Performance Management** **Work Environment**	**Staffing**

Figure 2.2 – Conceptual Matrix of People CMM: Adapted from Curtis B, Hefley WE, Miller SA. 2001. People Capability Maturity Model® (P.CMM®)Version 2.0 Software Engineering Institute CMU/SEI-2001-MM-01*Maturity Model*, Version 2, 2001 page 43

The components of the structure of the People CMM as shown in figure 2.3 include maturity levels, process areas, goals and practices.

Figure 2.3 – Components and structure of People CMM : Adapted from Curtis B, Hefley WE, Miller SA. 2001. People Capability Maturity Model® (P.CMM®)Version 2.0 Software Engineering Institute CMU/SEI-2001-MM-01*Maturity Model*, Version 2, 2001 page 48

The information for practices that relate to implementation has been gathered through the survey while information related to the institutionalization has been gathered through interviews. The '*Practices Performed*' falls in the implementation category while *Commitment* and *Ability to Perform, Measurement and Analysis* and *Verifying Implementation* fall under the category of institutionalization.

The mapping of the various practices to process area goals is shown in figure 2.4.

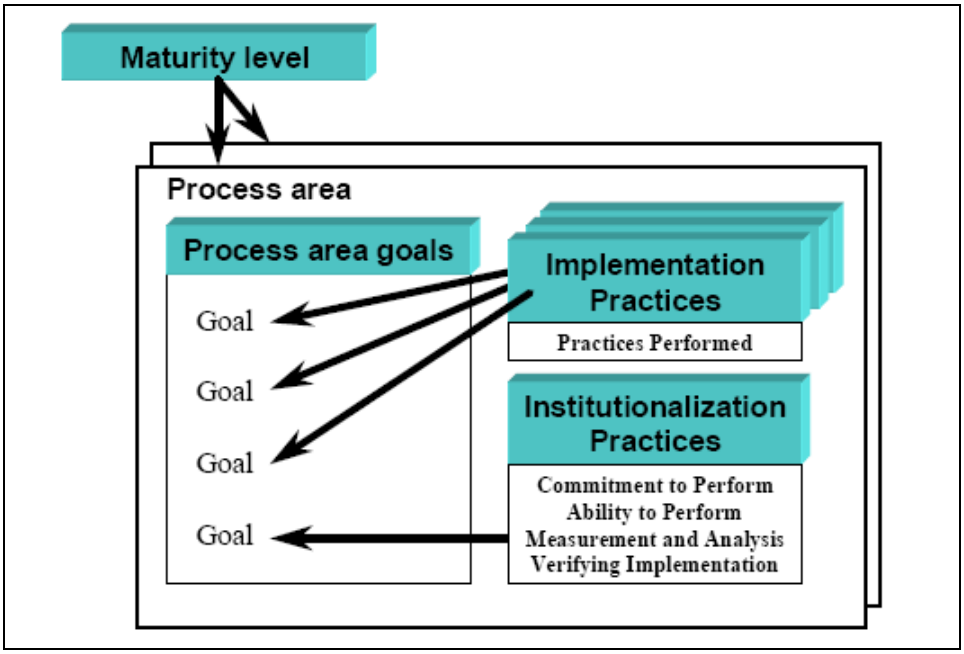

Figure 2.4 – Mapping of practices to process area goals: Adapted from Curtis B, Hefley WE, Miller SA. 2001. People Capability Maturity Model® (P.CMM®)Version 2.0 Software Engineering Institute CMU/SEI-2001-MM-01*Maturity Model*, Version 2, 2001 page 54

2.2 Research instruments

At the onset of this research attempts were made to find a tested and readily available instrument which could be utilized for conducting of the survey and the interviews, however such attempts did not yield any result. As a consequence it was required to formulate questions based on P-CMM, my own insights and theoretical research on the chosen topics. While the implementation practices formed the basis for survey instrument, institutionalization practices were utilized for formulation of the interview instrument. The practices were translated into relevant questions from the perspective of transformation of individual academic knowledge into organizational competence. Additionally questions relating to Knowledge Management and legacy applications were also added to arrive at an instrument suitable for this research.

2.3 Sample selection

The following sections describe the basis of sample selection and the way the survey, the interviews and focus group discussion were carried out.

Survey

The sample for survey was selected based on relevance of function, location, type of job, involvement in garnering individual academic knowledge. In order to remove any bias and to achieve a better spread across the Softwarehouse the employees who qualified with reference to all other criteria but were not following any course in the OU track also formed a part of the survey sample as the control group. The population was also divided on the basis of level, namely management and execution level. The chi square analysis was used to identify a significant difference in opinion in the two categories namely OU/ Not OU and Management/Execution levels.

111 employees were selected for conducting the survey and 72 responses were received.

Interview

The interviews were conducted to gather information for this research based on the institutionalization practices of People CMM. Additionally questions about Knowledge Management were also included. In total 14 interviews were conducted. 9 of the selected interviewees were the ones who had a high likelihood of having the information about institutionalization of the practices.

Focus Group Discussion

While the survey and interview were carried out in parallel, the focus group discussion was carried out after a preliminary analysis of the results of interviews and survey. The objective of the focus group discussion was to arrive at the change management strategy that could possibly be adopted to bring about the required changes in the Softwarehouse to facilitate the transformation of individual academic knowledge into a competent organization. Besides this, solutions were identified for the challenges. There were 8 participants in the focus group discussion.

3. Lessons learned from People CMM implementations

If we could sell our experiences for what they cost us, we'd all be millionaires.
Abigail Van Buren

Implementation of a conceptual framework in an organization is where theory meets practice. Every improvement effort requires that the path be treaded carefully such that pitfalls can be avoided. In this chapter an attempt has been made to get an insight into implementations of P-CMM. The objective is to identify the critical success factors in P-CMM implementations in ICT organizations.

The original concept for a process maturity framework was developed by Watts Humphrey and his colleagues at IBM® in the early 1980s. While working for IBM Humphrey noticed that the quality of a software product was directly related to the quality of the process used to develop it. He wanted software organizations to continually improve their software development processes. However, he had observed that improved software development practices did not survive unless an organization's behavior changed to support them. Consequently, he designed the process maturity framework to enable an organization to achieve a state of continuous process improvement in five stages (Curtis, Hefley, Miller, 2001).

The primary goal of P-CMM is to guide organizations in improving the capability of the work force. Work-force capability can be defined as the level of knowledge, skills, and process abilities available for performing an organization's business activities. Work-force capability indicates an organization's readiness for performing its critical business activities, its likely results from performing these business activities, and its potential for benefiting from investments in process improvement or advanced technology.

Implementation of any model or framework requires customization at the time of implementation and P-CMM is no exception. P-CMM needs to be tailored to the specific organization needs to derive the best out of the best practices. Sound business judgment always prevails.

During the People CMM implementation at the Computer Science Corporation (CSC) (Gray, 2002) it was found that the one of the keys to success was how closely the human resources worked with the project. Other factors that were identified were combined review of matrices in early stages, identification of central point of contact between both HR & project and open lines of communication. They observed that valuing differing perspectives, sharing of

findings and best practices and combined assessment team participation were also important for a successful implementation.

It was also found that that it helped to involve the employees from the beginning of the improvement effort. Survey of the employees to take their advice from the start was identified as one of the lessons learned in P-CMM implementations. Alignment of project and HR activities, usage of volunteers and assignment of process owners at project level were amongst the other lessons learned.

In her presentation on Practical Approaches to Initiating and Sustaining a Successful People CMM Effort, at the SEPG Conference, Cecilia Miller, of Lockheed Martin Mission Systems (Miller, Weszka, 2000) has identified the critical success factors for P-CMM Level 3. Executive management commitment, where the management communicates its vision, establishes objectives, allocates resources and ensures that anomalies to plan are reported monthly were identified as critical success factors. Besides this, process owners for each process area who provide focal point for coordination of data gathering and are established champions with accountability were also considered to be critical to the success for sustaining a P-CMM effort. The third identified critical factor was of communication channels at all levels.

Translating business unit goals, defining of specific individual objectives, training at the right time to fit the actual needs and monitoring performance and giving feedback have been identified as the challenging issues for an assessment (Vivaldi, Berg, 1999) which forms the baseline for the improvement effort. They conclude that management commitment is critical to the success of P-CMM implementation.

Curtis and Alden (2007), note that the misconception begins when people fail to understand the basic insight that led Watts Humphrey to propose his original framework (Curtis, Alden, 2007). The great insight underlying maturity models designed from the process maturity framework is that you cannot improve just the core business processes without improving the way they are managed and supported at the same time.

Paulk (1999) suggests that the best recommendation regarding CMM interpretation is to develop a mapping between CMM terminology and the language used by the organization. In particular, terms dealing with organizational structures, roles and relationships, and formality of processes need to be mapped into their organizational equivalents. Examples of organizational structures include “independent groups” such as quality assurance, testing, and configuration management. Appropriate organizational

terminology for roles such as project manager and project software manager should be specified.

Racelis and Weber (2005) have identified the issues in P-CMM implementations. They observe that process assessments (e.g., People and Software) if done independently and not coordinated may produce inconsistent results. They also observe that process assessments (e.g., People-CMM and Software-CMM) are often viewed as separate "initiatives". Improving workforce practices may be viewed as "other work" and delivering products & services usually viewed as the "real work". Managers may not have time for "other work". This would make it important that it is made clear, how the P-CMM (i.e., workforce practices) supports the business, such that improving workforce practices may be not be viewed as "other work".

It has been emphasized that P-CMM-based improvement programs should be conducted as part of an overall organizational improvement strategy. Process improvement initiatives based on P-CMM run the risk that they would be identified as just a human resource initiative. They opine that such an initiative should be presented as a program for operational management to improve the capability of its work force. Although human resources, training, organizational development, and related disciplines have unique expertise that can assist operational managers in improving their work-force practices, the responsibility for ensuring that an organization has a capable work force lies primarily with operational management.(Curtis, Hefley,2003)

Ericsson research, Canada (2001) identified senior management's commitment before assessment, involvement of the human resource function throughout the change process, ensuring a solid improvement infrastructure and culture and tying P-CMM with business strategy and goals as the important success factors in CMM implementations.

In their P-CMM implementation experience the organization Accenture (2007) identified managing change by managing it like a software engineering project, measuring the initiative progress quantitatively, building effective processes and implementation aids, establishing effective communication and continuous leadership involvement as the top five success factors.

Weszka and Miller (2000) of Lockheed Martin Mission Systems point out that human resources should drive the P-CMM implementation efforts as this effort requires a different focus. This can help the P-CMM initiative to exploit synergy with other process improvement activities as well.

Samsung's Babour et al (2000) observe that model implementations take longer and cost more than typically estimated. They also noticed that P-CMM implementations involve significant parts of the entire organization. Besides this, they found that experience, training and education were invaluable to any process improvement effort and the human resources welcome the model as a facilitating tool for accomplishing their job. The commitment of the top management was also identified as a key success factor.

Based on these implementation experiences in various organizations in my opinion the most important success factors are :

- Executive management commitment;
- Involvement of employees from the beginning of the improvement effort;
- Mapping of P-CMM terminology with the language used in the organization;
- Establishing effective communication;
- Connecting People CMM initiative to the business strategies and goals;
- People CMM initiative as a coordinated effort between human resources and operational management with clear definition of responsibilities.

The most important pitfalls where the organization should watch out for would be:

- The People CMM should not be identified as just a human resource initiative;
- Difficulty in interpretation of the CMM terminology;
- The higher than expected costs of process improvement initiatives;.
- The perception that improvement of workforce practices is not the real work;
- Lack of leadership involvement.

Every organization is different and therefore every organization should carefully plan and implement its own improvement initiative. Experiences of other organizations are only the directions that can be followed by organizations while discovering their own path.

4. Issues in management of legacy applications

"I always get nervous when people start talking about legacies."

Bill Clinton

Legacy systems can be defined as antiquated systems, that are difficult to cope with, but are vital to the organization. The age of such applications could vary between 10 and 50 years. The applications which came into existence before the advent of World Wide Web are also often categorized as legacy applications.

The Princeton Internet Computer dictionary (Princeton Lang Inst , 1994) defines it as old software still in use but which could benefit from re-engineering using more modern methods.

Legacy systems pose a big challenge to the organizations. On one hand there are compelling reasons to keep them and on the other hand they are difficult to keep. Legacy systems are difficult to maintain and improve. While the original designers of the system have often left the organization, the available documentation is mostly insufficient, leading to lack of understanding of legacy systems.

The decision making over the future of legacy applications is also not easy. It is not without reason that despite the availability of more cost-effective technology, about 80% of IT systems are running on legacy platforms (Zoufaly, 2001).

Despite these problems, organizations can have compelling reasons for keeping a legacy system. The costs of redesigning large monolithic legacy systems are prohibitive and the 100% availability requirement makes difficult to be taken out of service. The costs of designing new systems with 100% availability are high and there is often lack of understanding of the existing legacy system.

Amongst the factors that drive towards change are the rigidity of predefined process flows and business policies which are embedded in legacy applications. It is also difficult to find qualified staff who can work on applications which are not written in modern languages. As a result of these problems legacy applications often eat a huge chunk of the maintenance budget.

The decision to modernize a legacy system should be made only when the life of software cannot be extended, if it is not possible to add new features and capabilities, new interfaces, middleware without disrupting the continuance of the core system, and if modernization contributes to the business value. The decision to modernize should not be made only because it seems to be the right thing to be done or because everyone else is doing it (Enriquez, Undated).

There are four strategic options (Somerville, 2000) for the organization while making decision over legacy applications. When the system no longer makes an effective contribution to the business process, scrapping the system can be an option. This happens when the changed business processes have evolved or changed and there is no longer a dependency on the legacy systems. When the legacy system is stable and only minor system changes are required continuance should be the option of choice. To improve maintainability, transformation of the system can be opted. This is useful when the system is in degraded state due to regular changes and more regular changes are expected. Replacing the system with a new system can be an option when due to factors like hardware the legacy system cannot continue or off the shelf products are available allowing development of new systems at reasonable cost.

Once it is established that it is required to migrate a legacy application, various strategies can be adopted. Brodie and Stonbraker (1993) identified two strategies for migration of legacy systems *viz.* Cold Turkey and Chicken Little. Cold Turkey involves rewriting a legacy IS from scratch to produce the target IS using modern software techniques and hardware of the target environment. Chicken Little involves migrating the legacy IS, in place, by small incremental steps until the desired long term objective is reached. Each step requires a relatively small resource allocation (e.g., a few person years), a short time, and produces a specific, small result towards the desired goal. This is in sharp contrast to the vast resource requirements of a complete rewrite (e.g., hundreds of person years), a multi-year development, and one massive result. If a Chicken Little step fails, only the failed step must be repeated rather than the entire project. Since steps are designed to be relatively inexpensive, such incremental steps do not need to promise dramatic new function to get funded.

A comparison of the two strategies proposed by Brodie and Stonbraker (1993) has been made in the table 4.1

Aspect	Cold Turkey	Chicken Little
Expectation of management	Management is often not willing to budget the required major expenditure if the only payoff is to lower future maintenance costs. Additional business functions must be promised. This adds complexity to the replacement IS and increases the risk of failure.	A Chicken Little migration of a large legacy IS spreads over years. Major expenditure is not required in one go thus management does not demand extra functionality for sanctioning of budgets.
Coping with evolving legacy information systems	The development of large, complex IS requires years to accomplish. While the legacy IS rewrite proceeds, the original legacy IS evolves in response to maintenance and urgent business requirements, and by midnight functions (i.e., features	This approach is by definition spread over a longer period of time. This leads to unanticipated requirements before migration. The critical success factor, and challenge in deployment, is to

Continued on next page

	installed by programmers in their spare time). It is a significant problem to evolve the developing replacement IS in step with the evolving legacy IS.	identify appropriate portions of the IS and the associated planning and management to achieve an incremental migration that is feasible with respect to the technical and business requirements.
Lack of specifications	There is no specific way that the cold turkey approach can deal with this aspect.	There is no specific way that the Chicken Little approach can deal with this aspect.
Cut Over (process of switching from the legacy IS to the target IS).	Legacy IS's can be too big to cut over. Many legacy information systems must be operational almost 100% of the time. Many legacy databases or files require weeks to dump or download. Even if the rewritten IS were fully operational, there are no techniques to migrate the live data from the legacy IS to the new IS within the time that the business can support being without its mission critical IS. Live data must also be converted to fit the new system, again increasing project time and complexity. This may not just add complexity, it often prohibits Cold Turkey altogether.	Since Chicken Little can be broken into smaller steps the cutover step is used to iteratively cut-over operations from the legacy applications to the target applications, application by application, site by site, and user by user according to specific requirements.
Management of projects	The cold turkey projects are big and thus difficult to manage. There is a tendency for such projects to grow uncontrollably in head count. Managing more and more people results in less and less useful work.	The Chicken Little approach proposes small steps thus risk of low productivity due to high number of people is low.
Risk of termination and failure	There is a tendency for large projects to become bloated which increases the risk of failure makes them more vulnerable to termination.	Since the Chicken Little works in iterative steps the risk of failure is low. If a step fails, it is only that particular step that has failed and it is easy to go back.
Deployment	Deployment is not iterative	Deployment of Chicken Little consists of five basic steps: • Iteratively migrate the computing environment. • Iteratively migrate the legacy applications. • Iteratively migrate the legacy data. • Iteratively migrate the user and system interfaces. • Iteratively cut-over from the legacy to the target

Table 4.1 A comparison of the two strategies, Chicken Little and Cold Turkey

While most available strategies can be used to decide the future of legacy systems, a study carried out on 85 organizations (Kelly, 2004) has tried to analyze the root cause of legacy systems and proposed the complexity perspective of enabling environments that reduce the legacy problem. As per the complexity theory, the belief that legacy systems are caused only by technical reasons is not true. It is argued that legacy is a socio-technical issue, with the socio factor playing a greater role than recognized.

Unless the underlying reasons responsible for the creation of legacy systems are understood, the risk that the new systems will also quickly become legacy systems is high. As per the complexity perspective of enabling environments 'if co-evolution between the business process and IT development is enabled, then the problems associated with legacy systems will be reduced.' The three related concepts in this perspective are co-evolution which is defined as the reciprocal influence between related entities that results in a change in two or more related entities, feedback and social ecosystem which includes all the related co-evolving entities such as businesses, governments, financial institutions, regulatory and standards bodies, customers, etc. which are able to influence each other. The term entities is used, as the concept can apply to (a) units of analysis in different disciplines such as species in biology or organizations in the social sciences; (b) interacting departments or groups within the same organization; or (c) different types of related organizations such as suppliers, buyers, customers, etc. (Kelly, 2004)

The complexity theory proposes that for legacy problems to be reduced, there needs to be a mutual understanding between IT professionals and business professionals. IT professionals should understand the business process, its language, values, direction and future development, to achieve IT systems that support business, and business strategists should understand the technical potential as well as the limitations well. Such mutual interaction and understanding is not easy as the people in the technical domain are usually culturally and psychologically different than the business professionals.

Communication, trust and understanding are essential for facilitation of co-evolution between the business and IT domains.

In my opinion there are quite a few technical solutions available on how to migrate the legacy systems, should the decision be made. Guidelines for making strategic decisions over the future of legacy systems are also available, as is the analysis of the problems that organizations face while maintaining and working on legacy systems. There is however limited research available on tackling the root cause of legacy systems. While the complexity theory addresses the social perspective there is not enough material available on how legacy systems can

technically be minimized. The presence of legacy systems creates a dilemma for the development of the professionals who are engaged in maintaining such applications. On one hand they need to keep pace with changing technologies and on the other hand they need to provide support for applications which were once not categorized as legacy applications. Retaining employees to work on legacy applications and at the same time providing them growth opportunities is therefore a challenge in itself.

5. Interventions in organizational development and change

To exist is to change, to change is to mature, to mature is to go on creating oneself endlessly
Henri L. Bergson

Organization development (OD) is a system-wide application of behavioral science knowledge to the planned development and reinforcement of organizational strategies, structures, and processes for improving an organization's effectiveness (Cummings, Worley, 1997). OD relates to the interaction between different groups within organizations, where a suitable structure exists and appropriate policies and procedures are in place. OD is involved not only in the initial effort of implementing a change but goes a step further to institutionalize the change within the organization.

The activities that take an organization from the current state to the desired state are known as OD interventions. OD interventions can be defined as structured activities in which the selected organization or units engage in a task or sequence of tasks with the objective of organizational improvement and individual development. The purpose of interventions is to deliberately attempt to change the organization towards a more effective state. An intervention can be said to be effective based on the extent that it fits the requirement of the organization, the degree to which it is based on causal knowledge of intended outcomes, and on the degree to which the change management is transferred to the organization members (Cummings, Worley, 2001).

There are different types of interventions that can be applied depending upon the scope and focus. The focus of intervention can range from an individual to the whole organization. The strategy to be applied is chosen on the basis of the problem that is required to be tackled. The commonly chosen intervention strategies are human process approach and techno structural approach. While the human process approach focuses on interpersonal and inter group processes the techno structural approach focuses on matching the technology to the organizational structure. Human process approach includes organization confrontation meeting, intergroup relations, large group interventions and grid organization development. Technostructural approach includes structural design, downsizing and reengineering.

The intervention strategies involve the mechanism of structuring an OD intervention. The strategy determines how the problem is diagnosed, what the desired result should be and the steps that would be required in order to achieve the goal. The common definitions of OD and intervention strategies are shown in the Table 5.1. .

Table 5.1- An analysis of selected definitions of organization development – Adapted from French & Bell (1989)

	Components of the Organization development process				
Author	**Nature and scope of the Effort**	**Nature of activates/ interventions**	**Target of interaction/Activities**	**Knowledge Base**	**Desired Goals, Outcomes, or end states of OD Effort**
Beckard	Planned Organization wide. Managed from top.	Planned interventions in the organization's "processes"	Total organization. Organization's 'processes'	Behavioral science knowledge	Increased organization effectiveness and health
Bennis	Complex educational strategy. A response to change	Educational. change - oriented	Beliefs, attitudes, values and structures of organizations.		Better ability to adapt to new technologies, markets, and challenges, and the dizzying rate of change itself.
Gordon Lippitt (on OD)	A process.	A process of initiating, creating and confronting needed changes.	[Implied] total organization.		Enhance the ability of the organization to become or remain viable. Adapt to new conditions. Solve problems. Learn from experience. Move toward great organizational maturity.
Schmuck and Miles	A planned & sustained effort.	Apply behavioral science for system improvement. Using reflexive, self-analytic methods.	Total system (organization).	Behavioral science	System improvement. [implied] continued self-analysis and reflection.
Burke and Hornstein	A process of planned change.	Change-oriented and self-examining oriented, specifically change of an organization's culture from one which avoids an examination of social processes in organization to one which institutionalizes and legitimizes this examination.	the organization's culture and the social processes in organization, especially decision making, planning and communication.		[self-examination] or social processes in organization, especially decision making, planning, and communication.
French and Bell	A Long rage effort.	Designed to bring about a more effective and collaborative management of organization culture; using assistance of change agent, or catalyst.	Organization culture. Culture of formal work teams. Organization's problem solving and renewal processes.	The theory and technology of applied behavioral science, including action research.	Improve an organization's problem-solving and renewal processes.

The P-CMM framework proposes the IDEAL life cycle model for improvement. The IDEAL model has been proposed as the roadmap for initiating planning and guiding improvement actions. The IDEAL model defines a systematic, five-phase, continuous process improvement approach, with a concurrent sixth element addressing the project management tasks that span five phases.

- Initiating: establish support and responsibilities for improvement;
- Diagnosing: identify the problems to be solved;
- Establishing: select and plan specific improvement activities;
- Acting: design, pilot, implement, and institutionalize improvements;
- Learning: identify improvements in IDEAL-based activities.

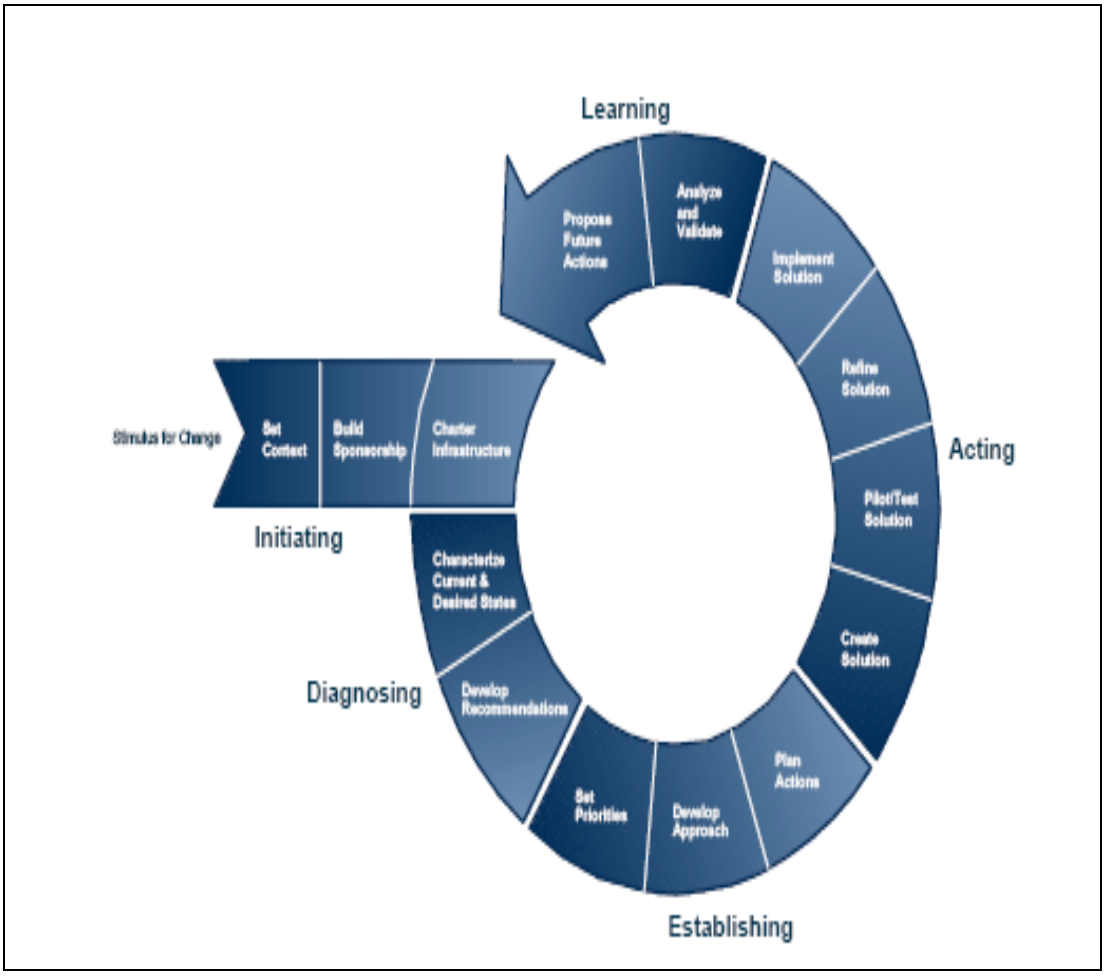

Figure 5.2 - The IDEAL cycle Adapted from Curtis B, Hefley WE, Miller SA. 2001. People Capability Maturity Model® (P.CMM®)Version 2.0 Software Engineering Institute CMU/SEI-2001-MM-01*Maturity Model*, Version 2, 2001 (page 85)

In order to implement change, the change agents can make use of various change facilitation strategies. Commonly used facilitation strategies include participation, communication, diffusion practices, human resource practices, rites

and ceremonies, inter organization relationships and formalization practices (Welborn, 2001)

A brief description of the facilitation strategies is provided below:

Strategy	Description
Participation	Participation is used as the primary means to empowering the employees, with level of participation being directly related to positive outcome.
Communication	Use of formal and informal communication channels as a way to facilitate the change process.
Diffusion Practices	This involves moving the change through the organization often with the help of transition teams
Human Resource Management Practices	Use of instruments such as evaluations, appraisals, compensation, interviewing for positive and negative reinforcement
Rites and Ceremonies	Use of ceremonies to introduce or conclude an organizational change
Inter-Organization Relationships	Using supervisor/subordinate and relationships across work functions to coordinate and ease the change process
Formalization practices	Use of updating job descriptions or revision of organization structure to introduce change

Table 5.2 – Facilitation Strategies

In my opinion the application of the People CMM framework through the IDEAL cycle can be seen as an OD effort where the intervention can theoretically be considered to be effective because the idea is to customize the practices to the organization, thus it fits the organization, it is based on best practices thus there is causal knowledge of intended outcomes, and finally it institutionalizes practices and measures them thus the change is transferred to the organization members.

6. Knowledge Management and its role in People CMM

Knowledge is of two kinds. We know a subject ourselves, or we know where we can find information upon it ~Samuel Johnson

In the competitive environment that organizations face themselves today, it is knowledge that creates the difference between the organizations that perish, survive or excel. Irrespective of the industry, Knowledge Management occupies an important place in the tool kits of most managers.

Knowledge can be defined as a justified personal belief that increases an individual's capacity to take effective action (Nonaka, Huber, 1991). Knowledge Management encompasses the various activities relating to the identification, creation, representation and distribution of knowledge often with the objective of improved performance and a competitive edge. Knowledge Management can be seen as a specialized form of organizational learning with a focus on development and cultivation of the knowledge flow.

The believers in the power of Knowledge Management expect certain benefits from this exercise. Knowledge Management ensures availability of increased knowledge content while developing and provisioning for products and services. This often results in shorter product development life cycles. One of the important expected advantages is that the expertise of specialists can be leveraged across the organization. This results in better sharing of knowledge and avoids reinventing of the wheel while facilitating organizational learning. With the goal that knowledge does not only remain in the minds of people but spreads, Knowledge Management makes it easier to manage the intellectual capital especially for recruitment and selection. All the above mentioned benefits also lead to organizations with greater responsiveness and resilience towards environmental factors.

Alavi and Dorothy (1999) have ascertained three perspectives that managers ascribe to the concept of Knowledge Management. The three perspectives are: information based, technology based and culture based.

They found that in terms of the information-based perspective, Knowledge Management was viewed to be about characteristics of information, such as readily-accessible information, real-time information, and actionable information. Reducing the overload of information through filtering the gems form the rocks was also found to be a major concern. Often Knowledge Management was viewed as a means of keeping track not so much of knowledge itself, but of who held the knowledge and how to locate them.

In terms of the technology-based perspective, the managers associated Knowledge Management with various other systems and tools. Knowledge Management was associated with information technology infrastructure and more specifically, with the integration of cross-functional systems worldwide.

In terms of the culture-based perspective Knowledge Management was found to be associated with learning (primarily from an organizational perspective), communication, and intellectual property cultivation.

Nonaka and Takeuchi (1995) have differentiated between Japanese and Western models of knowledge. In the Western model knowledge is characterized as a commodity: something formal, controllable, quantifiable, explicit and systematic. On the other hand the Japanese model lays emphasis on tacit knowledge. Tacit knowledge is not easily visible and is difficult to express, is highly personal and hard to formalize.

According to Nonaka and Takeuchi (1995) human knowledge is created and expanded through social interaction between tacit and explicit knowledge. The knowledge-generative iterative process moves through four realms in its journey from tacit-explicit-tacit: socialization, externalization, internalization, combination which is illustrated in Figure 6.1.

	Tacit Knowledge to Explicit Knowledge	
Tacit Knowledge	***Socialisation***	***Externalisation***
From Explicit Knowledge	***Internalisation***	***Combination***

Figure 6.1 – The knowledge generated iterative process, Adapted from Nonaka I, Takeuchi H. 1995. The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation Four modes of knowledge conversion

Externalization is defined as the process of articulating tacit knowledge into explicit concepts via such means as metaphor, analogy, hypotheses or models (Nonaka, Takeuchi 1995). Internalization is defined as the process of embodying explicit knowledge into tacit knowledge through socialization (Nonaka, Takeuchi 1995). Socialization is sharing of tacit knowledge through face to face communication or shared experience. Combination is defined as combination of various elements of explicit knowledge.

Nonaka and Takeuchi (1995) argued that a successful Knowledge Management program needs to, on one hand; convert internalized tacit knowledge into explicit codified knowledge in order to share it, but also on the other hand for individuals and groups to internalize and make personally meaningful codified knowledge once it is retrieved from the Knowledge Management system.

There are eight key areas of Knowledge Management based on EFQM (European Foundation for Quality Management) and have been extended or differentiated to represent KM specific aspects (Ehms, Langen, 2001).

Key Area	Description
Process, Roles, Organization	This key area involves matters relating to organizational structure and the assignment of Knowledge Management roles. The aim is to discover how Knowledge Management activities can be added to specific business processes.
Strategy, knowledge goals	This key area concerns itself with corporate vision and strategy with respect to Knowledge Management.
Environment, Partnerships	This key area relates to the participants from outside the system boundary, such as customers or comparison with similar enterprises.
People, Competencies	This key area deals with the topics of Knowledge Management which itself with soft factors.
Collaboration, Culture	In this area the attention is given to aspects such as corporate culture, communication, team structures which can have significant influence on Knowledge Management of an organization.
Leadership, support	This key area concerns itself with the roles played by managers, management models and agreement on targets.
Knowledge Structures, Knowledge Forms	This key area involves itself with the structure of the organizational knowledge base such as classification criteria for knowledge and documents.
Technology Infrastructure	This key area deals with the aspects of information management with the help of IT systems.

Table 6.1 – Eight key areas of Knowledge Management

Although the benefits of Knowledge Management are often recognized, there are only few Knowledge Management efforts known to be successful. Siemens (2002) has identified lack of common language, competition between units, barriers to knowledge sharing, lack of financial reward or promotion and poor corporate culture that does not foster openness or builds confidence as the common cultural barriers to knowledge sharing.

Amongst the other critical issues that pose a challenge for Knowledge Management are allowing technology to drive Knowledge Management within the organization, not tying in mission critical and business goals into a Knowledge Management plan, treating Knowledge Management as though once it is in place it no longer needs to be updated, and failing to realize that not all information is knowledge (Santosus, Surmacz, 2003).

Dingus (1988) identified organizational challenges that effect the implementation of content management systems, which are often used for Knowledge Management. These challenges, or problems, have a direct impact on the planning of Knowledge Management systems. Amongst the important identified problems were lack of adequate training, failure to follow established practices and procedures, poor communication between levels of management, lack of clearly defined criteria for quality levels and lack of personal accountability.

Various best practices (Siemens, 2002) and success factors (Caldwell et al., 2003) have been identified for sharing of knowledge. The best same have summarized in table 6.2

Author / Company	Best Practices / Success Factors
Siemens (2002)	Connecting people: developing employee networks among best practice owners; Exchanging best practices: best practice marketplace that provides documented knowledge; Relying on management commitment: engaging patrons and sponsors Mobilizing employees: incentives, rewards, and recognition; Designing a content structure: drawing a best practice landscape; Energizing support: facilitators and "The Best Practice Office" by actively establishing best practice sharing across the company.
Edwards & Company (Caldwell et al., 2003)	The eight success factors that were common to all successful enterprise Knowledge Management programs were: Communication and building support ; Use of Knowledge Management to support critical business processes; Obtaining executive sponsorship ; Building a Knowledge Management system that maps knowledge to processes and roles ; Establishing a formal Knowledge Management team; Implementing content management and strong content governance ; Integrating with other Knowledge Management and information management initiatives; Listening to users and continually make refinements to help make their jobs easier; Getting the buy-in from the total organization so it becomes part of their culture.

Table 6.2 – Best practices and success factors

Relation between Knowledge Management and P-CMM

P-CMM was introduced to help organizations characterize the maturity of their workforce practices, establish a program of continuous workforce development, set priorities for improvement actions, integrate workforce development with process improvement, and establish a culture of excellence. (Curtis 2002). Knowledge Management can be viewed as the process that leverages information and expertise to more effectively solve problems and make decisions. Knowledge Management has been defined as the fluid mix of framed experience, values, contextual and actionable information, and expert insight that provides a framework for evaluating new experiences and information. (Harigopal 2001).

Both P-CMM and Knowledge Management have the goal of organization development. While Knowledge Management is more philosophical and strategic in nature P-CMM lays emphasis on procedures and institutionalization of practices. Overlap with Knowledge Management has been found in the some of the process areas of P-CMM (Curtis, Miller, 2001).

The conceptual matrix of P-CMM shows the process areas at different levels.

Maturity Levels	Process Area Threads			
	Developing Individual Capability	Building Work Groups and Culture	Motivating and Managing Performance	Shaping the work force
5 Optimizing	Continuous Capability Improvement		Organizational Performance Alignment	Continuous Workforce Innovation
4 Predictable	Competency Based Assets Mentoring	Competency Integration Empowered Workgroups	Quantitative Performance Management	Organizational Capability Management
3 Defined	Competency Development Competency Analysis	Workgroup Development Participatory Culture	Competency Based Practices Career Development	Workforce Planning
2 Managed	Training and Development	Communication & Coordination	Compensation Performance Management Work Environment	Staffing

Figure 6.2 – Conceptual Matrix of People CMM: Adapted from Curtis B, Hefley WE, Miller SA. 2001. People Capability Maturity Model® (P.CMM®)Version 2.0 Software Engineering Institute CMU/SEI-2001-MM-01*Maturity Model*, Version 2, 2001 page 43

At level 4 of People CMM, in the process area 'competency based assets' has the purpose of capturing the knowledge, experience, and artifacts developed in performing competency-based processes for use in enhancing capability and performance.

A competency-based asset captures the knowledge, experience, or artifacts developed in performing competency-based processes within an organization. A competency-based asset is a bundle of information or an artifact that has been prepared in standard format and made available for widespread use. As an organizational asset, it becomes a component of one or more workforce

competencies. The concept of a workforce competency is expanded at the Predictable Level to include not just the knowledge, skills, and process abilities of individuals and workgroups, but also the accumulated assets that can be reused by other members of their competency community (Curtis, Hefley, Miller, 2001). Thus, competency-based assets include many of the concepts discussed in areas such as Knowledge Management, learning organizations, or reusable product components

At level 5 the purpose of 'Continuous Capability Improvement' is to provide a foundation for individuals and workgroups to continuously improve their capability for performing competency-based processes.

Continuous Capability Improvement involves enterprise-wide support for individuals and workgroups as they focus on improving their capability in the performance of competency-based processes. The organization establishes a voluntary framework for continuously improving personal work processes and workgroup operating processes. Within each competency community, actions are taken to continually improve the capability and performance of competency-based processes. Individuals focus on the capability of their personal methods for performing competency-based processes. Individuals analyze the capability of their personal work processes, identify opportunities for improvement, and establish measurable improvement objectives. Individuals engage in learning activities to continuously improve the capability and performance of their personal work processes (Curtis, Hefley, Miller, 2001).

Another process area at level 5 'Continuous Workforce Innovation' having the purpose of identification and evaluation of improved or innovative workforce practices makes use of the idea of Knowledge Management. Continuous Workforce Innovation involves establishing mechanisms for proposing improvements in workforce activities, identifying needs for new practices, surveying and evaluating innovative practices and technologies, conducting exploratory trials of new practices and technologies, and implementing the most beneficial ones across the organization (Curtis, Hefley, Miller, 2001).

Continuous Workforce Innovation involves establishing mechanisms for proposing improvements in workforce activities, identifying needs for new practices, surveying and evaluating innovative practices and technologies, conducting exploratory trials of new practices and technologies, and implementing the most beneficial ones across the organization. Innovative workforce practices and technologies include new channels for recruiting, new selection techniques, innovative ways to manage performance, innovative technologies for communication, creative compensation schemes, introducing new media and methods for developing knowledge and skills, alternative career

choices, and new ways of organizing and empowering the workforce (Curtis, Hefley, Miller, 2001).

Although Knowledge Management and P-CMM have organizational development as their goal, their focus is different. P-CMM is more procedural in nature and aims for customized standardization. Knowledge Management is more generic and strategic in nature and work. Knowledge Management is aimed at increasing organizational knowledge base by nurturing the knowledge assets of the company. Organization (processes, policies, and products), people (competencies, profiles, and roles), customer (business, behavior patterns) and general business environment (markets, industries, and trends) fall within the scope of Knowledge Management practices. P-CMM while having a broader applicability in comparison to Knowledge Management leaves out the customer and the general business environment.

In my opinion the application of Knowledge Management in P-CMM is initiated at a higher level (Level 4 and 5), while organizations that are identified to be at lower levels could also benefit from it. P-CMM makes use of explicit forms of knowledge which are predominantly artifacts and does not cover internalization and socialization. It could be interesting to see how organizations at all levels of P-CMM could benefit from internalization and socialization and how Knowledge Management could be incorporated at the lower levels of P-CMM. In my opinion in the IT sector, organizations should not wait to reach a higher level of maturity, before they introduce Knowledge Management. It is of utmost importance for the organizations like the Softwarehouse to begin as early as possible and derive the support that Knowledge Management has to offer in their endeavor to remain competent.

7. Data analysis

In this chapter the primary data collected through the interviews and survey is summarized and analyzed. The detailed description can be found in appendix D.

Consequent to lack of readily available research instruments for survey and interviews, specific instruments were developed on the basis of P-CMM and review of literature on Knowledge Management and legacy applications. The questions were labeled on the basis of practices in People CMM, for example, WEG1P2 denotes process area work environment, goal 1 and practice 2. Considering the scope of the study, the instruments were tested on a limited number of employees before they were use on a larger population. Additionally questions relating to Knowledge Management and legacy applications were added in order to arrive at an instrument suitable for this research.

7.1 Sample selection

The following sections describe the basis of sample selection and the way the survey, the interviews and focus group discussion were carried out.

Survey

The sample for survey was selected on the basis of the following factors: -

- **Relevance of function**: The staff functions secretary, resource coordinator, executive planning & control and executive business support were not considered relevant for the purpose of the survey. The functions that could be related to the core business of the Softwarehouse, of producing and maintaining software were considered as the target group. The functions that were attributed as relevant for the purpose of the survey were lead engineer, team leader (teamleider), change manager (verandermanager), product advisor (productadviseur), software architect, test analyst (test analist), information analyst (informatieanalist), senior developer (senior ontwikkelaar), developer (ontwikkelaar), application administrator (applicatiebeheerder), process specialist (processpecialist), senior software architect, functional analyst (functioneel beheerder), senior information analyst (senior informatieanalist), product specialist, user interface specialist;
- **Location:** As per the available information Softwarehouse is spread across 4 locations namely Amsterdam, The Hague, Meppel and Odijk. The sample was selected so as to represent all the locations;
- **Type of job**: Only permanent internal employees were considered for the purpose of the survey;

- **Involvement in garnering individual academic knowledge:** In this case the employees who were following a course with the Open University of The Netherlands;
- **Control group**: In order to remove any bias and to achieve a better spread across the Softwarehouse the employees who qualified with reference to their function but were not following any course in the OU track also formed a part of the survey sample.

Of the total of population, more than 50% of the employees following courses with the Open University and more than 50% of the employees not following the courses were considered for the survey, with the expectation of receiving at least a response from 50%. A total of 111 employees were sent the survey and 72, (64%) responded. The distribution of the survey was done through email. In order to facilitate the response the employees were informed about the survey through the fortnightly newsletter.

The following table which provides the division of the relevant internal functions across the locations was used for the purpose of the survey:

Location	Amsterdam		Odijk		The Hague		Meppel		Total	
Name of function	OU	Not OU	OU	Not OU	OU	Not OU	OU	Not OU	OU	Not OU
Lead Engineer			5	1			2	2	7	3
Team Leader			4	2		1	2		6	3
Change Manager								1	0	1
Product Advisor			2	4				1	2	5
Software Architect			1				1	1	2	1
Test Analyst			1	3				1	1	4
Information Analyst	1	1	10	5				1	11	7
Senior Developer	3	1	8	1			10	9	21	11
Developer	1		15	8	4		6	8	26	16
Application Maintainence Specialist (Applicatie beheerder)			1				1		2	0
Process specialist			1						1	0
Senior Software Architect			1						1	0
Functional Specialist (Functioneel Beheerder)				3					0	3
Senior Information Analyst			2	2					2	2
Product Specialist			1	1					1	1
User interface specialist	1								1	
								Total	84	57

Table 7.1 Division of functions

Interview

The interviews were conducted to gather information for this research based on the institutionalization practices of P-CMM. Additionally, questions about Knowledge Management were also included. In total 14 interviews were conducted. 9 of the selected interviewees were the ones who had a high likelihood of having the information about institutionalization of the practices. The functions personnel management advisor (PMA), team leader, lead engineer, executive business support (medewerker bedrifjsbureau), resource coordinator, process specialists were considered as the target group. The selection within the target group was random. To remove bias 5 interviewees were selected from the target group of the survey and excluded the functions personnel management advisor (PMA), team leader, lead engineer, executive business support (medewerker bedrifjsbureau), resource coordinator, process specialists to form the control group.

Focus Group Discussion

The focus group discussion was conducted with a total of 8 randomly selected members from the management team, business support department (bedrijfsbureau) and the personnel management advisor.

The report of the focus group discussion is included in the appendix F.

The following sections present an overview of the collected data through the interviews and survey. The analysis has been divided on the basis of process areas of P-CMM and identified topics from literature review.

7.2 Data grouped according to process areas of P-CMM

Process Area Thread – Developing Individual Capability

Training and Development
The purpose of Training and Development is to ensure that all individuals have the skills required to perform their assignments and are provided relevant development opportunities.

On the question of 'availability of relevant development opportunities that can help you put acquired knowledge into use', a majority (53%) of employees thought there were relevant development opportunities available, however, there was a significant difference in opinion between the Not OU and OU group with a chi square value of 8.871. Between the management and execution levels, the chi square value of 3.115 indicated no significant difference. Overall, it cannot be concluded that irrespective of division by group a majority of employees feel that they have relevant development opportunities for putting acquired knowledge into use.

On the question of 'hindrance in development due to unique knowledge of legacy system', 10% employees thought that they faced such a hindrance while 84% did not experience such a problem. Overall the opinion was uniform with no significant difference in OU/Not OU group (chi square value of 1.075) and the management and execution levels (chi square value of 2.940).

It was thought by 64% respondents that a Knowledge Management system could facilitate spread of unique functional or technical knowledge. With chi square values of 1.288 and 1.737 in OU/ Not group and management and execution level there was no significant difference across the groups.

In the case of OU track there was general agreement that sufficient training time was not only being made available but was also being availed. The facility was also attributed by some as luxury.

The performance of training and development activities of the OU track in Softwarehouse are being measured and their status is determined in terms of the number of hours spent on study, through the timesheet system (e-synergy), through the personnel development plan (PJP) and certifications.

Competency Analysis
The purpose of Competency Analysis is to identify the knowledge, skills, and process abilities required to perform the organization's business activities so that they may be developed and used as a basis for workforce practices.

Most respondents thought that although they had not seen a policy for conducting its competency analysis activities, the available instruments; function profile, competency profile and the competency sheets were a proof of the existence of some policy. The project 'competent for future' (competent voor toekomst) was identified as an important step in competency analysis activities.

The actions of the business support department (Bedrijfsbureau) and resource management, which involved amongst others, the filling in of competency sheets, were seen as an indicator of some policy. Some respondents felt that there is room for improvement in case of competency sheets, which could be more balanced. It was felt that to decrease the difference in insights the competency sheets should be made more objective.

It was observed that the responsibility for competency analysis lies with resource management with the help of resource coordinator, and team leaders, but the possibilities were limited. It was observed that formally the human resource department (P&O) was responsible for coordinating the competency analysis activities. The higher management (directie) along with their team is the owner of the project 'competent for future'. It was also observed that while most teams were reactive in their approach towards competency analysis, the department O3 was seen as proactive.

Defined practices and procedures for incorporating/ mapping the acquired knowledge of the employees while performing competency analysis in Softwarehouse were observed to be a combination of personal development plan (PJP) appointments, competency sheets and the mapping thereof. The competency sheets are updated at least twice per year by the team leader and provided as input to resource management for further administration. Resource management is further responsible for the mapping in consultation with the team leader. The OU study track is not yet a part of it.

The majority of respondents thought that measurements were not being made and used to determine if the quality of workforce competency description and information also reflects the acquired knowledge of the employees, while others thought that although there is no explicit mapping, implicit mapping exists through function profile description. It was felt that the function description is 70% of the actual work. It was observed that function descriptions were generic and there were a lot of competencies that were covered.

Competency Development
The purpose of Competency Development is to constantly enhance the capability of the workforce to perform their assigned tasks and responsibilities.

A narrow majority of respondents (51%) were not aware of development and work opportunities related to enhanced work force competencies, 35% of the respondents were aware of such responsibilities. There was no significant difference in opinion across OU/ Not OU group (Chi square value of 4.809) and management and execution levels (Chi square value of 2.874).

A majority (65%) of respondents felt that through the following of courses at OU was enhancing the competency level of the organization. There was however concern about lack of direct link between the followed courses and their relevance for work. There was no significant difference in opinion across OU/ Not OU group (Chi square value of 0.091) and management and execution levels (Chi square value of 2.888).

A majority of respondents (65%) thought that Knowledge Management systems within competency communities could facilitate in increasing capabilities. Overall there was no significant difference in opinion across groups with Not OU and OU group (Chi square value of 0.823) and management and execution levels (Chi square value of 2.888).

It was felt by a majority of respondents (56%) that competency based experience and information about individuals would facilitate putting acquired knowledge to practice while 31% were not sure if it would help. Across the groups there was no significant difference in opinion in the OU / Not OU group (chi square value of 0.337) and management and execution level (chi square value of 1.004).

While at the level of Softwarehouse many respondents were not aware of the core competencies required to perform the business processes, at the level of ISC (a level higher than the department) the core competencies at the organization level such as alertness, responsibility were known and were incorporated to function profiles. It was observed that the OU track, which was not yet a part of the Competency Development activities, should be a part of it.

The responsibility and authority for ensuring that Competency Development activities are performed was of the team leader with the support of resource management and personnel management advisor.

Most respondents thought that there were enough resources available for planned Competency Development activities. Some respondents mentioned that

while the project 'competent for future' was already happening at level of ISC it has not begun at the level of Softwarehouse. The OU track was seen as sufficient proof that enough resources were being provided.

The procedure for Competency Development in Softwarehouse is not defined and documented. Some respondents mentioned that although it was happening informally within resource management, the coverage was limited. It was also observed that practices are defined and procedures are expected. It was also argued that since it was in place for ISC, therefore it was also in place for Softwarehouse.

It was observed by respondents that the quality of competence development activities was not measured in Softwarehouse. Although there was no policy, completion of study and certifications were its manifestations. It was mentioned that measurement was happening implicitly, through the activities of the competence centre testing and measuring (testen en toetsen) over projects. It was felt that the quality of competence development activities was only monitored through PJP (also through frequency of PJP) but was not directed.

Most respondents were not aware of if there was periodic review of the Competency Development activities, their status, and results. It was thought by some respondents that the department business support was responsible for it.

The definition and use of data on Competency Development is not periodically audited for compliance with organizational policies. The available instrument 'competency sheet' is not audited although some respondents thought that it was being done team leaders and the business support department.

Mentoring

The purpose of Mentoring is to transfer the lessons of greater experience in a workforce competency to improve the capability of other individuals or workgroups

A majority (65%) of respondents thought that mentoring could support the development and improvement of acquired competencies. It was felt that this activity should be delegated to someone who is specialized in 'competence management' and is able to coordinate & facilitate such processes. No significant difference was observed across the groups, with OU/Not OU having chi square value of 1.058 and management and execution level having a chi square value of 1.224.

A high number of respondents (42%) did not know if mentors assist workgroups in developing acquired capabilities. One possible reason could be the fact that in the past there was a mentoring program for new employees to help them find their way in organization and at the moment there are mentors from OU who help employees with the OU courses, another could be that the question should have been framed better with 'should assist' in place of 'assist' . The opinion was not uniform across groups with a significant difference in the opinion of management and execution level (chi square value of 7.293), while the chi square value of 4.462 indicated no significant difference in the opinion of Not OU and OU group.

Although there is no policy for conducting mentoring activities, most respondents thought it would help to facilitate conversion of knowledge into practice.

The opinion was divided on the requirement of a role to coordinate mentoring activities across the organization. While some respondents thought that it would be going too far to have a special role while others thought that in the initial phase, (around 6 months) a role would be required to coordinate the mentoring activities in a uniform manner.

It was felt that trainings could be helpful in developing the knowledge skills, process skills needed in the mentoring techniques and skills. It was observed that mentoring involves more talent than skill, people have to be selected based on their talent and therefore mentors should be selected based on their capacity.

The possible ways of measurement of effectiveness of the mentoring activity in Softwarehouse were thought to be through surveys both for the mentor as well as the employee and addition of questions on mentoring in employee satisfaction survey.

With reference to verification of mentoring activity, it was thought by respondents that it would be going too far to have such measures in place. It was felt that if the mentoring activity takes place it is sufficient, although there would be a need to watch out for complacency once it is in place.

Process Area Thread – Motivating and Managing Performance

Work Environment

The purpose of Work Environment is to establish and maintain physical working conditions and to provide resources that allow individuals and workgroups to perform their tasks efficiently and without unnecessary distractions

A majority (60%) of the employees thought they were provided with a physical work environment that facilitates usage of acquired knowledge. Most respondents thought that only with the objective of usage of acquired knowledge, no specific facilities were required. There was no significant difference in opinion across groups with chi square value of 0.358 for OU/ Not OU group and a chi square value of 0.639 for management and execution level.

It was felt by respondents that at the policy level it was not required to explicitly consider facilitating the use of acquired knowledge. Some respondents thought that it was implicitly being taken care of, through virtual working place, infrastructure, video conferencing etc. One of the respondents mentioned that it already is a part because the physical work environment policy (arbo policy) takes care of security, health and wellbeing of the employees, therefore offering employees work that matches their capabilities would also be a part of it.

Performance Management
The purpose of Performance Management is to establish objectives related to committed work against which unit and individual performance can be measured, to discuss performance against these objectives, and to continuously enhance performance.

A majority (55%) of respondents thought that the measurable performance objectives based on committed work could not be related to OU. Although respondents recognized the benefits of following a course through OU, they could not see a direct relation between the work they did and the course they were following. The opinion was not uniform across groups with a high chi square value (9.096) for the OU/Not OU group. The chi square value of 3.739, however, indicated no significant difference in the opinion of the management and execution level.

A high percentage (70%) of respondents thought that recognition or reward at an appropriate basis at the end of successful completion of a study (e.g. OU) would motivate them to study further. The opinion was uniform across groups with no significant difference in opinion in OU/ Not OU group (Chi square value of 2.012) and management and execution level (Chi square value of 1.680).

It was observed that there is no documented policy to ensure that measurable performance objectives are also based on committed work that can be related to OU.

Most respondents thought it was a combination of the HR department (P&O), Business support department (Bedrijfsbureau) and OU assist and advise Softwarehouse so that the OU track also forms a part of the performance management. Specifically the role is for the personnel management advisor. At the team level, team leader could advise employees in line with the PJP policy which has the objective of establishing work objectives, competencies, and development, and in case the employees do not do well, team leaders can get in touch with OU.

It was felt that a certain level of orientation in performance management activities exists for individuals who participate in performance management activities. Some respondents thought that although there are courses available for orientation, it is not institutionalized, and is person dependent. It was felt by some respondents that there is appropriate orientation of the existing employees, however, it needs to be ensured that new people also get the orientation. Some respondents thought that orientation was sufficient and team leaders were often well prepared but the quality of effort from the employee's side was often insufficient.

Most respondents thought it was difficult to measure the performance of the performance management activities. Some respondents thought that performance could be measured through the use of SLIM tool at the project level and at a personal level it is not possible to measure the same. Some respondents thought that it could be done in the form of SMART PJP's and evaluation of PJP. It was also suggested that it should be a part of team leader's PJP. It was felt that at the individual level certifications and the scores in OU courses could also be used as indicators. It was felt that if PJP was supported with effective project assignments, the assignments could be used as an indicator. Some respondents thought it is going too far to measure performance management. It was suggested that the employee satisfaction survey could include questions on performance management. It was also mentioned that the measurement of quantity (number of times per year) was already being done by business support, but quality is not measured. It was also mentioned that the project 'Competent for Future' provides for a 360 degree feedback within a function profile and that would be an important step in measurement of performance management.

It was observed that though there is a role with responsibility of execution, there was no role with responsibility of verification of performance management activities. It was felt that such a measure would lead to extra bureaucracy although in case of difference of meaning it would be handy to have someone who can help in resolving the issues. .

Compensation
The purpose of Compensation is to provide all individuals with remuneration and benefits based on their contribution and value to the organization.

The opinion on this question of consideration of extra raise in salary (compensation) on completion of the OU study was almost equally divided (48%, yes and 46% No). Some respondents thought that it was not fair for the employees who had chosen not to study to various reasons / circumstances. It was also observed that completion study is no measure of productivity. In case it is really evident a small bonus is a better idea. Some respondents thought that there should be recognition and reward for achievements in your work while some others thought if the knowledge could be appreciated and valuable for other organizations (outside Softwarehouse) it would be worthwhile considering this option. It was felt by some that salary should be decided on the basis of function and performance. If one performs better after completion of a study or moves to a higher function this is logical. Some respondents thought that a bonus at the end of the study should be given, but, an increase in salary should be only related to work-related achievements. There was however no significant difference in opinion across groups with a chi square value of 3.361 for OU/ Not OU group and a chi square value of 4.020 for management and execution level.

As per the respondents there was no policy on how the compensation activities would be conducted/ reviewed on the completion of study such as from the OU. It was also mentioned that there is no direct relationship between skill level and amount of money that is earned and although there is no policy it does happen in practice. Some respondents thought that it would be logical to do this.

It was felt by some respondents that possibilities and available resources for compensation activities are limited, and extremely regulated. The resources that were identified by the respondents were dinner bon, bonus, extra salary, incentive, mention in newsletters, acknowledgement, and may be a different function. While some respondents thought that free time as an incentive was possible others did not think so. It was felt by some respondents that there was insufficient freedom and insufficient possibilities for providing incentives in comparison to the private sector.

Competency Based Practices

The purpose of Competency-Based Practices is to ensure that all workforce practices are based in part on developing the competencies of the workforce.

A majority of respondents (58%) felt that the work assignments were not designed to enhance personal and career development objectives. It was observed that the assignments are designed to be in line with the employee's knowledge and the work that is required to be done. There was no significant difference in opinion with chi square values of 0.506 and 1.316 for the OU/ Not OU group and management and execution level respectively.

A majority of respondents (70%) thought that the individual performance objectives will increase the capability of workforce, however, there were concerns about less or no overlap between the courses and work. The possibility of usage of the newly acquired knowledge was identified as an important factor for achievement of this goal. A chi square value of 3.931 indicated that there was no significant difference in the opinion of the OU / Not OU group is acceptable. There is also no significant difference in opinion between the management and execution level with a chi square value of 1.316.

A majority (68%) of respondents thought that application of acquired knowledge / competencies should be a part of ongoing discussion on work performance. There was however concern for the circumstances when there is less overlap/relevance between competencies and work or organization goals. It was felt that such a discussion could only be done if assigned tasks give the opportunity to apply the knowledge. It was also suggested that the discussion should also be done over the requirement of new knowledge/skill to keep the competence level updated. There was no significant difference in opinion across groups with a chi square value of 0.470 for OU/ Not OU group and a chi square value of 3.830 for management and execution level.

There was no clear opinion on this question of development of competency as a criterion for adjustment to compensation after a study has been followed, (yes 47%, no 28% and do not know 25%). It was felt that one person is more to 'translate' knowledge into competencies than another. On the other hand, competence(ies) which are not practiced in work are relatively 'worthless' for the organization. Some felt that it should be done if the market value of the employee is higher as a consequence of the followed study. The opinion was not uniform across groups. There was a significant difference in opinion in OU and Not OU group with chi square values of 7.628 while a value of 2.641 indicated no significant difference in opinion in management and execution level.

Although many respondents were not aware of any policy to promote increased capability in the organization's workforce competencies, some respondents mentioned that the policy was to found in the vision and mission of Softwarehouse. It was mentioned that competency management, schooling and education, internal growth, recruitment and selection are all part of it although it is not pursued actively. It was also mentioned that the project 'Competent for future' is a step in this direction. It was felt that PJP is a means, the commitment exists, the verification is difficult and the goals are difficult to formulate.

It was felt that it would be nice to have someone in Softwarehouse who is assigned the responsibility and authority to motivate employees to develop and apply workforce competencies who could help the employee formulate a growth path. It was also opined that it should not be one person, but it should be a collective responsibility. Some respondents thought that it was not required, as the role exists in the team leader and as the ultimate responsibility of head of Softwarehouse. The role of team leader was limited to the extent that the employees could be stimulated, further the initiative lies with the employee.

Most respondents though that executive management does periodically review the activities implementing competency based workforce practices. Some respondents expected it to happen as a part of the PJP process, where there are norms per function that have to be adhered to. .

Career Development

The purpose of Career Development is to ensure that individuals are provided opportunities to develop workforce competencies that enable them to achieve career objectives.

There was a high percentage of respondents who did not know (40 %) if the career opportunities in Softwarehouse facilitate growth in the workforce competencies after following a study program. It was observed by some respondents that the opportunities (jobs) were relatively fixed and the influence on career opportunities was only to a certain extent and for a modest part (small number of employees) of the organization. The opinion was not uniform across groups and there was a significant difference in both the OU/Not OU group and management and execution level with a chi square values of 6.660 and 6.732 respectively.

Although the opinion was divided on this question, a higher number of respondents (47%) thought that promotion criteria did not need to be reviewed in the light of OU track. It was opined that good performance in general should be reviewed and not only following of OU courses. There was no significant difference in opinion across groups with chi square value of 1.802 and 0.454 for OU/ Not OU and management and execution level respectively.

A majority (60%) of respondents thought that career options can facilitate conversion of acquired knowledge into practice. There was a concern that unless this was realized, to a certain extent most of the 'gained' knowledge and capabilities will 'flow away' within 1 or 2 years. There was no significant difference in opinion across groups. A chi square value of 1.862 indicates that there is no significant difference in opinion between Not OU and OU employees. There was no significant difference in opinion of management and execution level with a chi square value of 0.563.

While most respondents thought there was no policy to facilitate workforce competency after following a study program, the general policy regarding PJP could be used for this purpose. It was felt that if room for growth is not offered people will go to other organizations. It was opined that PJP was being developed further to incorporate such possibilities. It was also mentioned that the OU track is primarily meant to catch up with perceived backlog, which is a must in knowledge intensive industries. Some respondents mentioned that career development based on horizontal growth is possible, while others felt that the scope for horizontal growth was limited. It was also mentioned that the initiative lies with the employee because it is always possible to apply against vacancies and OU study will always a plus. It was also felt that within Softwarehouse there was no link between the followed study and growth

possibilities. It was also mentioned that this was a responsibility of team leader who has career development of employees as a responsibility.

Most respondents though that it was responsibility of personnel management advisor to coordinate the career development activities across the organization with the help of resource management, while some thought that it was a responsibility of team leader.

Most respondents thought it was the responsibility of the team leader along with the personnel management advisor to ensure the participation of employees in career development activities.

All respondents were unanimous that there were enough resources available for career development activities. Function specific and career development study possibilities, and through recruitment and selection were identified as possible ways of career development.

Most respondents thought that practices and procedures were not defined and documented, but availability of last minute course offers, career development and function based courses were a proof of such practices. The practices and procedure for career development defined and documented and are however known to the human resources department (P&O).

It was mentioned that it was only till the level of line manager through the appointment made in PJP, performance of career development activities measured. It was also being measured through the OU. Besides the appointments made in PJP, it was also possible to measure the performance of career development activities through change in function, empowering of the function, and evaluation of courses. It was also opined that development within the function itself was not measured.

It was opined by all respondents that there are no guidelines for non compliance of career development activities. It was expressed that it is a responsibility of the team leader with the support of personnel management advisor, business support (bedrifsbureau) and resource management.

While most of the respondents thought that executive management periodically review the career development activities and resolve issues, some thought it was not required as the team leader is responsible for career development and non compliance could be addressed through escalations.

7.3 Data based on Knowledge Management

Knowledge Management

A majority (82%) of respondents thought that socialization is a good way of knowledge transfer. There was a word of caution form the respondents that it should not be the only way of knowledge transfer and since it is usually not structured it could be left to the good will and presentation capability of the single component of the group. The opinion was not uniform across groups. A chi square value of 7.876 indicated a significant difference in opinion between Not OU and OU group. There was however no significant difference in opinion between management and executive level with a chi square value of 1.597.

A majority (73%) of respondents thought that learning by doing is the best way of practicing and retaining acquired knowledge. It was opined though that it was dependent on the personality of the individual and although for practicing and retaining acquired knowledge this is a good way, to learn new knowledge, this is a bad way. It was also opined that it maybe often true, but not always, such as in case of the certain 'don'ts'. The opinion across groups was not uniform. A chi square value of 8.048 indicated a significant difference in opinion of Not OU and OU group. There was no significant difference in opinion of executive and management level with a chi square value of 1.368.

The opinion was divided with more respondents (49%) against financial reward, incentive or recognition for sharing of acquired knowledge. It was felt by some respondents that since it is a part of jobs to share knowledge, a reward for it would make it special, therefore should not be rewarded separately. Some respondents thought it should be obligatory to share the knowledge, considering the amount of investment that has been done while some others thought financial reward or recognition is an incentive for everything. The opinion was uniform across groups with no significant difference in opinion. Chi square values of 0.905 and 3.030 for respectively for OU/Not OU and management and execution levels indicated no significant difference in opinion.

Most respondents thought that Knowledge Management systems can contribute in avoiding reinventing of wheel across different geographical locations. Both the infrastructure and practice were thought to be important by some respondents. It was felt that it was important to embed such systems in the organization. It was also expressed that through Knowledge Management systems one can partially limit the reinventing of the wheel but not completely.

It was felt that one person cannot be made responsible for and be given the authority to facilitate transfer of knowledge through a Knowledge Management system. It was felt that for the purpose of monitoring and organizing a role/owner could be assigned, however, such a person cannot do it alone.

Some of the possible ways suggested to measure the performance of knowledge transfer activities in Softwarehouse were number of hits, number of uploads in period of time, through measurement of productivity. It was also felt that participating in this activity would be more important than measurement of its performance. Number of suggestions for improvements, number of responses to number of hits, number of improvement suggestions to number of downloads, decrease of external knowledge, decrease in outsource work in the core business of Softwarehouse, how quickly an answer can be found through seeking answers on the system and the time saved by new projects through information from other projects were amongst the other measures that were identified.

General

Most respondents (84%) thought that the OU study was being facilitated to an incredible extent. The difference in opinion across groups was insignificant. A chi square value of 1.730 indicated no significant difference in opinion between the Not OU and OU group. There is also no significant difference in opinion between management and execution level with a chi square value of 0.842.

7.4 Key findings

The key findings of this research can be summarized below:

Work environment does not play an active role in the knowledge transformation process, although a majority of employees thought that it is important in general. In the case of Softwarehouse, a majority of employees thought they were provided with work environment that facilitates usage of acquired knowledge. It was also felt that at the policy level something special for this purpose was not required.

Within Softwarehouse emphasis is placed on competency analysis activities through use of available instruments such as function profile, competency profile and the competency sheets. The project 'competent for future' (competent voor toekomst) is also an important step in competency analysis activities. The responsibility of competency analysis lies with resource management with the help of resource coordinator, and team leaders. The function descriptions are generic and the quality of work force description is not audited.

In case of competency based practices, a majority of respondents felt that the work assignments were not designed to enhance personal and career development objectives. It was also felt by a majority of respondents that the individual performance objectives will increase the capability of workforce. A majority of respondents thought that application of acquired knowledge / competencies should be a part of ongoing discussion on work performance. However, there was no clear opinion on the question of development of competency as a criterion for adjustment to compensation, after a study has been followed. There was a significant difference in opinion in OU and Not OU group with chi square values of 7.628.

There is significant difference in opinion between the OU and Not OU group on the question of availability of relevant development opportunities that can help put acquired knowledge into use. The reasons for the difference are not known. 10% of employees face hindrance in development due to their unique knowledge

of legacy applications. As a facilitator it was thought by a majority of respondents that Knowledge Management systems could facilitate spread of unique functional or technical knowledge. The time made available for the OU study was found to be sufficient. The performance of training and development activities related to OU are measured directly and indirectly.

A majority (55%) of respondents thought that the measurable performance objectives based on committed work could not be related to the OU study, however the opinion was not uniform across groups with a significant difference in the OU/Not OU group. The reason for this difference in opinion is not known. A majority of respondents thought that recognition or reward at an appropriate basis at the end of successful completion of a study would motivate them to study further. Although there is no documented policy to ensure that measurable performance objectives are also based on committed work that can be related to OU, a combination of the HR department (P&O), Business support department (Bedrijfsbureau) and OU assist and advise Softwarehouse so that the OU track also forms a part of the performance management. The level of orientation of employees needs to be higher. Various ways of measurement of performance management have been suggested. In Softwarehouse there is no role for verification of performance management activities.

A narrow majority of respondents (51%) were not aware of development and work opportunities related to enhanced work force competencies while a majority of respondents felt that through the following of courses at OU the competency level of the organization was enhancing. It was felt by majority of respondents that Knowledge Management systems within competency communities could facilitate in increasing capabilities. It was also expressed by a majority of respondents that competency based experience and information about individuals would facilitate putting acquired knowledge to practice.

The procedure for Competency Development in Softwarehouse is not defined and documented and has limited coverage, however, the responsibility and authority for ensuring that Competency Development activities are performed rests with the team leader with the support of resource management and personnel management advisor. Periodic review of the Competency Development activities does not often take place.

There was high percentage of respondents who did not know (40 %) if the career opportunities in Softwarehouse facilitate growth in the workforce competencies. Interestingly, the opinion was not uniform across the groups. There was a significant difference in opinion in the OU/Not OU and management and execution levels.

Although the opinion was divided on this question, a higher number of respondents (47%) thought that promotion criteria did not need to be reviewed in the light of OU track. A majority of respondents thought that career options can facilitate conversion of acquired knowledge into practice. It was also felt that the scope for horizontal growth was limited.

The responsibility to coordinate the career development activities across the organization lies with the personnel management advisor, with the help of resource management, while the team leader along with the personnel management advisor is responsible for ensuring the participation of employees in career development activities.

The opinion on this question of consideration of extra raise in salary (compensation) on completion of the OU study was almost equally divided (48%, yes and 46% No), however, with no significant difference in opinion across groups. According to the respondents there was no policy on how the compensation activities would be conducted/ reviewed on the completion of study such as from the OU. It was felt by some respondents that possibilities and available resources for compensation activities are limited, and extremely regulated.

A majority of respondents thought that mentoring could support the development and improvement of acquired competencies. A high number of respondents (42%) did not know if mentors assist workgroups in developing acquired capabilities. The opinion was not uniform across groups with a significant difference in the opinion of management and execution level. One of the possible reasons could be ambiguity in the question. At present there is no policy for conducting mentoring activities. It has been suggested that it could help to have a role to coordinate the mentoring activities in a uniform manner, in the initial phase. It was felt that trainings could be helpful in developing the knowledge skills, process skills needed in the mentoring techniques and skills. The possible ways of measurement of effectiveness were also suggested. With reference to verification of mentoring activity, it was thought by respondents that it would be going too far to have such measures in place.

A majority (82%) of respondents thought that socialization is a good way of knowledge transfer, although there was a significant difference in opinion between Not OU and OU group. A majority (73%) of respondents thought that learning by doing is the best way of practicing and retaining acquired knowledge. In this case also, there was a significant difference in opinion of Not OU and OU group. The opinion was divided with more respondents (49%) against financial reward, incentive or recognition for sharing of acquired knowledge. Most respondents thought that Knowledge Management systems

can contribute in avoiding reinventing of wheel across different geographical locations. Both the infrastructure and practice were thought to be important by some respondents. It was felt that for the purpose of monitoring and organizing a role/owner could be assigned, however, such a person cannot do it alone. Various ways to measure the performance of knowledge transfer activities in Softwarehouse have also been suggested.

It was felt by a majority of respondents that Softwarehouse was facilitating the OU study.

8. The customized framework

While chapter VII has presented the findings at a micro level (Softwarehouse), this chapter attempts to provide customized framework for transformation of knowledge into a competent organization, based on abstraction of the findings at the micro level. This is shown in figure 8.1

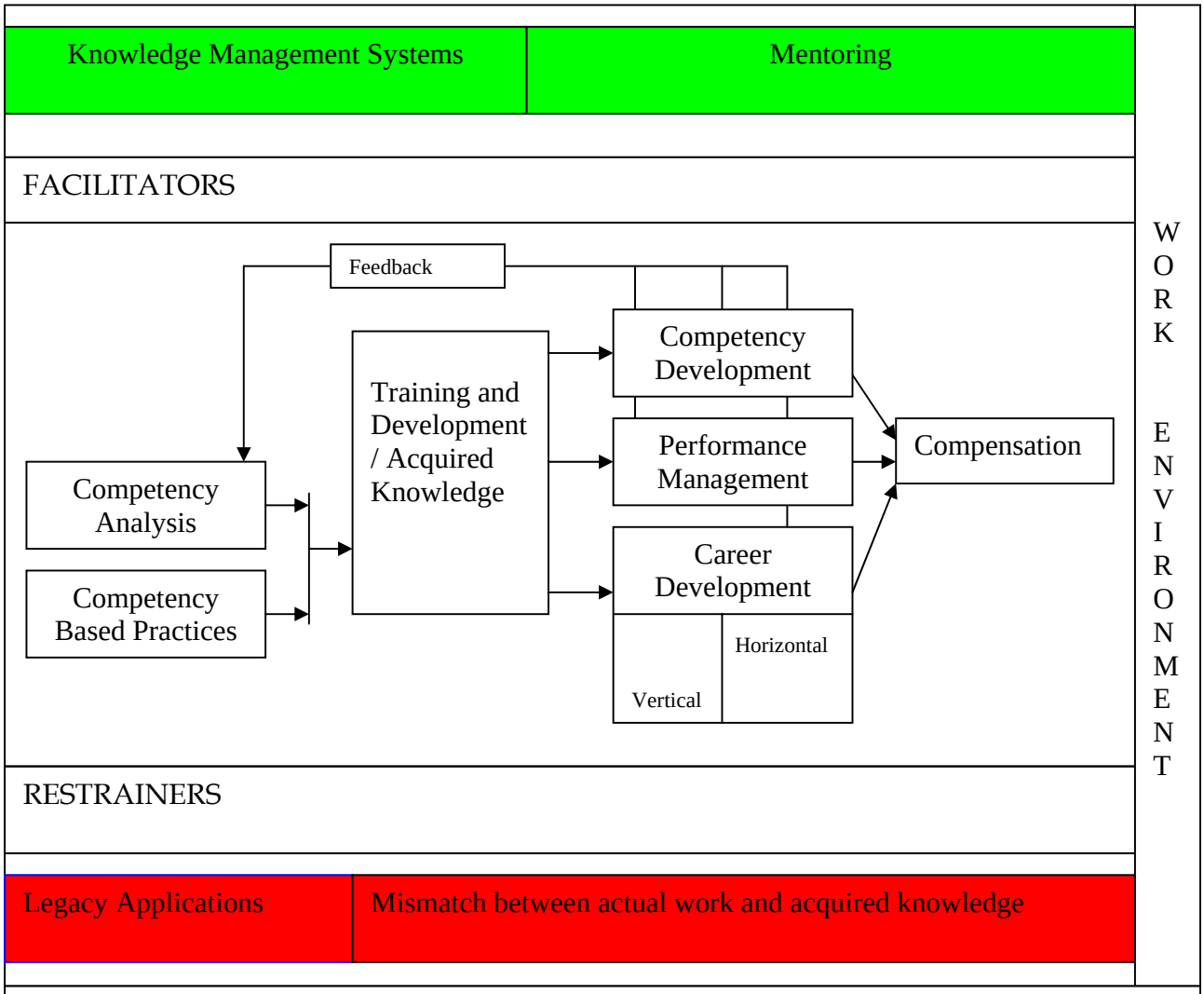

Figure 8.1 Transformation of knowledge into a competent organization

Figure 8.1 is explained below:
The transformation of academic knowledge into organizational competence occurs in an environment of facilitators and restrainers. Work environment which has the goal of establishing and maintaining physical working conditions and of providing resources that allow individuals and workgroups to perform their tasks efficiently and without unnecessary distractions, does not play an active role in this process, although it is important in general.

Through Competency Analysis the knowledge, skills, and process abilities required to perform the organization's business activities so that they may be developed and used as a basis for workforce practices are identified. Competency analysis is constantly updated with feedback from Competency Development, performance management and career development activities.

Competency-based Practices ensure that all workforce practices are based in part on developing the competencies of the workforce. Together, competency analysis and competency-based practices create a need for training and development to ensure that all individuals have the skills required to perform their assignments and are provided relevant development opportunities.

After training for ensuring development three process areas come into picture. Through Performance Management, objectives related to committed work against which unit and individual performance can be measured are established. These objectives are used to discuss performance, and to continuously enhance performance.

Competency Development involves in constantly enhancing the capability of the workforce to perform their assigned tasks and responsibilities. This ensures that the acquired knowledge grows further.

To provide for growth, career development ensures that individuals are provided opportunities to develop workforce competencies that enable them to achieve career objectives. Both horizontal and vertical growth opportunities can be made available.

Based on development of competency, better performance and / or a new step in career, compensation, which ensures that all individuals are provided with remuneration and benefits based on their contribution and value to the organization, is affected.

Mentoring which has the purpose of transferring the lessons of greater experience in a workforce competency to improve the capability of other individuals or workgroups acts as facilitator. Another facilitator is Knowledge

Management systems which encompass the various activities relating to the identification, creation, representation and distribution of knowledge often with the objective of improved performance and a competitive edge.

Legacy applications and a mismatch between actual work and acquired knowledge act as restrainers in the transformation of academic knowledge into a competent organization.

9. Conclusion and recommendations

"Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives."

– Willa A. Foster

Conclusion

The initiative of Softwarehouse of providing a possibility of academic study to its employees is rather unique. It has and will cost a considerable amount of time, money and effort to achieve the goal of professionalize. In its endeavor to bring its employees at par in competence with the market and to reap the benefits of this investment, Softwarehouse would have to facilitate the transformation of academic knowledge to create a competent organization.

Through this research the process areas from the process threads 'Developing Individual Capability' and 'Motivating and Managing Performance' from P-CMM have been identified that can applied to enhance and retain the acquired academic knowledge. The fundamental assumption is that a capable workforce will contribute to the competence of the organization.

This research has been carried out in Softwarehouse, and is primarily based on P-CMM. Owing to absence of readily available instruments, the instruments were developed on the basis of process threads Developing Individual Capability and Motivating and Managing Performance from the conceptual structure of P-CMM Additionally, literature review on Knowledge Management, legacy systems and organization development and change has also contributed to this research.

The survey was based on the implementation practices of P-CMM. The sample for survey was selected based on relevance of function, location, type of job, involvement in garnering individual academic knowledge. In order to remove any bias and to achieve a better spread across the Softwarehouse the employees who qualified with reference all other criteria but were not following any course in the OU track also formed a part of the survey sample as the control group. The population was also divided on the basis of level, namely management and execution level. The chi square analysis was used to identify a significant difference in opinion in the two categories namely OU/ Not OU and Management/Execution levels. Of the 24 questions asked for 6 there was a significant difference in opinion in case of OU and Not OU group. In case of the management and execution level for 2 questions there was a significant difference in opinion. The same has been shown in figure 9.1

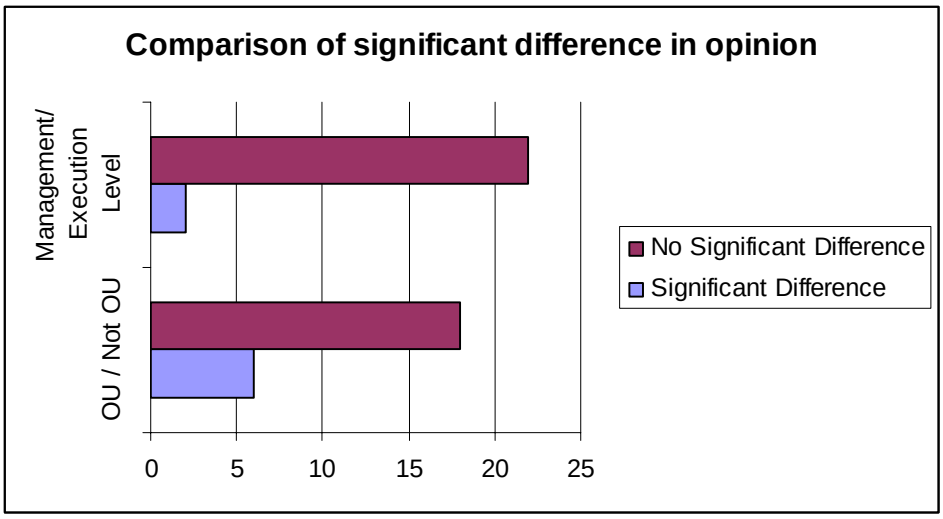

Figure 9.1 Comparison of difference in opinion between different groups

The areas where significant difference was observed in case of OU and Not OU group were Knowledge Management Competency Based Practices Career Development Training and Development and Performance Management. The areas where significant difference was observed in case of management and execution level were Career Development and Mentoring. In general it can be concluded that for a majority of questions there was no significant difference of opinion between groups, therefore bias based on following a study with OU or based on the level of function within the organization can be ignored in general.

The response to the survey can be treated as good, with a response rate of 64%. The respondents also contributed actively to the remarks section of the survey providing a rich source of information and basis for suggestions for this research.

The interview was based on institutionalization practices of P-CMM. In total 14 interviews were conducted. 9 of the selected interviewees were the ones who had a high likelihood of having the information about institutionalization of the practices. The response to the interviews was also enthusiastic.

While the survey and interview were carried out in parallel, the focus group discussion was carried out after a preliminary analysis of the results of interviews and survey. The objective of the focus group discussion was to arrive at the change management strategy that could possibly be adopted to bring about the required changes in the Softwarehouse to facilitate the transformation of individual academic knowledge into a competent organization. Besides this, solutions for the challenges were identified.

The findings at the level of Softwarehouse have been summarized in chapter VII. In an interesting parallel to the findings of this research, it was acknowledged (New York State CIO Council's Human Resources, 2006) that there will always be skill gaps, training alone will not eliminate all gaps, and priorities must be set and constantly adjusted to ensure efforts are focused on strategies that generate the greatest benefits for the enterprise.

As a result of this research a customized framework of transformation of knowledge into a competent organization has also been developed. During this research facilitator and restrainers for transformation of academic knowledge have been identified. Legacy applications along with mismatch between actual and acquired knowledge have been identified as restrainers in the knowledge transformation process while mentoring and Knowledge Management systems were identified as facilitators.

In case of implementation of an improvement effort based on this research, it should be guarded against the fact that such an improvement initiative does not run the risk that it would be identified as just a human resource initiative, it being based on P-CMM. Such an effort should be treated as a program for operational management to improve the capability of its work force and Softwarehouse should be actively involved in it.

In order to implement such an initiative, the P-CMM based IDEAL improvement effort can be used. The IDEAL improvement effort has five phases, *viz.* initiating, diagnosing, establishing, acting and learning. In this research the focus has been the diagnosing phase. For the acting phase it was established during the focus group discussion that the following change strategies could be adopted:

Strategy	Description	Remarks
Participation	Participation is used as the primary means to empowering the employees, with level of participation being directly related to positive outcome.	Priority 1, should be used. It is important to ensure overall participation.
Communication	Use of formal and informal communication channels as a way to facilitate the change process.	Should not be used, to avoid focus on formal and informal communication channels
Diffusion Practices	This involves moving the change through the organization often with the help of transition teams	This should be used if the team is comprised of intern employees
Human Resource Management Practices	Use of instruments such as evaluations, appraisals, compensation, interviewing for positive and negative reinforcement	Priority 1, should be used, as the use of would make use of HRM instruments is indispensable
Rites and Ceremonies	Use of ceremonies to introduce or conclude an organizational change	Priority II, but should not be forgotten, would be required at least at the time of introduction of such an effort.
Inter-Organization Relationships	Using supervisor/subordinate and relationships across work functions to coordinate and ease the change process	Priority I, it is important to do it, and to let it be known. The role of supervisor and subordinate relationship could play a crucial role in the implementation of such an improvement effort
Formalization practices	Use of updating job descriptions or revision of organization structure to introduce change	Should not be used as it would involve updating of job descriptions and organizational structure, which is a cumbersome process and is not required for this improvement effort.

Although various aspects around transformation of individual academic knowledge into a competent organization have been covered, ranging from the restrainers to the facilitators, the effect of the process threads, building work groups and culture shaping the work force still remains to be seen. It also remains to be seen if the use of process areas vertically has an impact on the proposed customized framework.

Recommendations

Based on this research the following recommendations are suggested to transform the individual academic knowledge to organizational competence. The recommendations have been defined with a focus on process areas, instruments, facilitators and restrainers.

Mentoring

Mentoring should be introduced to support the development and improvement of acquired competencies. Before mentoring can introduced, it will be required to organize it in Softwarehouse.

Mentors should be chosen based on talent and should be provided training to hone mentoring skills.

Sufficient time should be made available for mentoring activity.

It would be advisable to initially have a role that coordinates and facilitates the mentoring effort in a uniform manner and after sometime when it is embedded in the organization, the role can be taken over by team leaders.

The effectiveness of the mentoring effort should be measured through employee satisfaction survey

Competency Based Practices

An effort should be made to create an overlap between courses followed and work that is to be done.

Softwarehouse should actively help its employees formulate a growth path. Options of horizontal growth should also be provided.

Application of acquired knowledge and requirement of new knowledge should be a part of ongoing discussion on work performance.

Competency Analysis

The policy for conducting competency analysis activities should be made known to the employees.

The competency sheets should be made more objective such that the difference in interpretations is decreased.

The competency sheets should be updated with acquired academic knowledge, in this case through the Open University. The employees should be made responsible for updating their competency profile with every significant change. In this way competency sheets will be updated often and will not be limited to twice in a year.

Specific function descriptions with respect to products could be developed to have a better insight in the content of functions, facilitating better matching of acquired knowledge and available functions.

Training and Development

Relevant development opportunities should be offered to put acquired knowledge to use.

If unique knowledge of a legacy application is a hindrance to the development of an employee, individual action plans and appointments should be made to overcome the problem.

Career Development

Possibilities for horizontal growth should be created.

Softwarehouse should facilitate conversion of acquired knowledge through career options.

Employees should be encouraged to apply against available vacancies, which can open new opportunities of growth for them.

Management should review career development activities.

An attempt should be made to replace external consultants with internal employees when the internal employee has developed the same level of capability as the external employee.

Employees should be provided with a possibility to activate their profile when they are looking for a change. Since at the moment such a possibility does not exist, a possible solution could be that the employees can communicate to their team leader when they are looking for a change. The team leaders could inform resource management, who in turn can give priority to such people while looking for internal placements.

Compensation

A raise in compensation after the completion of study should only be considered if the performance increases or the employee moves to a higher function as a result of the followed study.

Performance should be measured and there should be a criterion for adjustments to compensation.

Success should be celebrated. Recognition, such as through newsletters should also be given to the employees who perform well. The basis for recognition, rewards and, or incentives should be made so transparent that it does not become a de-motivating factor.

Performance Management

An effort should be made, as far as possible, to provide measurable performance objectives based on committed work that can be related to the study at OU

Recognition and a one time bonus should be considered at the completion of a study.

PJP training should be made a part of the induction program for new employees. The team leaders should recommend PJP training to all employees who have not followed such trainings. This will facilitate better articulation of objectives and uniformity orientation.

Employee satisfaction survey should include questions on performance management.

There should be a role which can resolve performance management issues.

The focus should be on replacing the external consultants on the newer application (projects) with internal employees such that internal employees have an increased chance of applying their acquired academic knowledge to practical work. Care should however be taken that in this exercise business objectives are not compromised.

Competency Development

It is advisable to ascertain how the acquired academic knowledge can contribute to the existing functions of employees. The employees should be made aware of such possibilities. This will promote application of acquired knowledge.

If it is not possible to make use of acquired knowledge within the existing function, an opportunity to make use of and to retain the acquired knowledge can be provided through competence centers.

A knowledge database of competency based experience and information about individuals where it is possible to see 'who knows what' should be made available to employees to facilitate applying acquired knowledge to practice.

Awareness about the core competencies of Softwarehouse should be created, a link between the core competencies of ISC and core competencies of Softwarehouse should be established.

Employees should be made aware of the practices and procedures with respect to Competency Development activities.

Work Environment.

An effort should be made to provide facilities for easy sharing of knowledge.

Knowledge Management Systems

Socialization should be used as one of the ways of knowledge transfer. It is advisable to undertake this in an organized way by trained professionals.

Opportunities to practice and retain acquired knowledge should be provided.

Sharing of knowledge should be explicitly made a part of the job card.

Performance of knowledge transfer activities should be monitored.

Legacy Systems

The environments which can be categorized as legacy systems should be identified. It should be ensured that employees working on such applications are not deprived of opportunities of growth and application of their acquired academic knowledge. This process is not organized yet and would require further research.

Unique knowledge should be transferred. Knowledge Management systems can be a way to achieve this transfer.

It should be communicated to clients that maintenance of legacy products would become more and more expensive and would eventually be phased out.

To ensure that the functional knowledge is not lost, appointments can be made with contract parties.

If there are no other options then 'sharing the pain' should be considered, implying that more people should be partly assigned to such applications, providing such employees a chance to work on newer applications at the same time as they work on legacy applications.

As per this theory, for legacy problems to be reduced, there needs to be a mutual understanding between IT professionals and business professionals. IT professionals should understand the business process, its language, values, direction and future development, to achieve IT systems that support business, and business strategists should understand the technical potential as well as the limitations well.

Personnel development Plan (PJP)

It is advisable to develop check lists for the PJP which could act as guidelines for carrying out of the PJP meetings.

It is important to emphasize that the initiative and responsibility for the PJP lies both with the team leader and the employee, and all initiative is not restricted to the employee.

The extent to which the measurable performance based on committed work can be related to the study at OU should form a part of the PJP guideline.

The employees would also need to be informed that the extra responsibility of updating the competency sheet in case of significant difference in the academic level lies with them.

If an employee works on a legacy application, it should be taken up proactively during the PJP meetings. It should be made a part of the PJP guideline (check list).

Assignment Evaluation

The assignment evaluation (opdracht evaluatie) form has been used in the past for performance evaluation of assignments carried out by the employees for the stakeholders. It is not being used at the moment. It can be useful to reintroduce the form with the possible addition question about use of newly acquired academic knowledge.

10. Limitations and scope for further research

This research has at least the following limitations:

The assessment instruments have been designed by the researcher on her own based on the People CMM version 2.0, and theoretical research on Knowledge Management and legacy systems. The instruments were tested on a limited number of respondents before being used, however it was not possible to make comparisons with similar instruments.

To ensure a geographical spread all the locations were proportionately covered, however response from one of the locations was limited.

No statistical analysis was done to find out if opinion was different across different locations.

The assessment instruments were in English, while the target population was primarily Dutch speaking. This could have introduced an error, due to difference in language.

This research is based on two process strings of People CMM *viz.* motivating and managing performance and developing individual capability. It does not take building work groups and culture shaping the work force into consideration.

There is scope for further research on the following topics:
It has been recommended to ascertain how the acquired academic knowledge can contribute to the existing functions of employees. It would be interesting to see to what extent the acquired academic knowledge has an added value to the actual work. In case such a direct relationship does not exist creative ways of applying acquired academic knowledge in existing functions should be sought.

Socialization as a way of knowledge transfer costs a lot of time. It could be of value to Softwarehouse to find out how it can be structured in Softwarehouse such that the benefits of socialization as a means of knowledge transfer can be optimally derived.

Presently there is no process in place for identification of employees who through their work on legacy systems could be deprived of opportunities of growth. It would be important for Softwarehouse to work out a process such that while the critical functional and technical knowledge of the legacy system is not lost, growth opportunities are also made available.

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Appendix A Definition of concepts

People CMM: The People Capability Maturity Model (People CMM) is a framework that helps organizations successfully address their critical people issues. Based on the best current practices in fields such as human resources, Knowledge Management, and organizational development, the People CMM guides organizations in improving their processes for managing and developing their workforces.

Legacy applications: An application in which a company or organization has already invested considerable time and money. Typically, legacy applications are database management systems (DBMSs) running on mainframes or minicomputers.

Knowledge Management systems: Knowledge Management System (KM System) is a system for managing knowledge in organizations, supporting creation, capture, storage and dissemination of expertise and knowledge. The idea of a KM system is to enable employees to have access to the organization's knowledge of facts, sources of information, and solutions.

Competency Sheet: Competency sheet is an instrument in used in Softwarehouse, through which employees can update their competency profile.

PJP: This is the name of the yearly personnel development plans that are used in Softwarehouse. There are three PJP meetings per year held between employees and their managers.

Appendix B Questionnaire for interview

1	WEG3CO1	Does the documented policy for providing physical work environment (arbo conditions) also take into consideration facilitating the use of acquired knowledge? If not do you think it is required?	
2	PRMG5CO1	Is there a documented policy to ensure that measurable performance objectives are also based on committed work that can be related to OU?	The purpose of Performance Management is to establish objectives related to committed work against which unit and individual performance can be measured, to discuss performance against these objectives, and to continuously enhance performance.
3	PRMG5CO2	Is there an organizational role that can assist and advise Softwarehouse so that the OU track also forms a part of the performance management (e.g. through PJP)?	
4	PRMG5AB4	Do you think individuals who participate in performance management activities receive appropriate orientation in performance management activities?	
5	PRMG5ME1	Can the performance of performance management activities be measured and the status determined? If yes, how?	
6	PRMG5VE1	Are performance management activities verified by a responsible individual, can he/ she address noncompliance?	
7	TDG3AB3	Do you think sufficient training time is made available to each individual as per the organization's training policy, (e.g. are people really able to get 50% of the work time?)	
8	TDG3ME1	Is the performance of training and development activities (in this case the OU track) measured and is their status determined?	
9	COMG4CO1	Is there a documented policy on how the compensation activities would be conducted/ reviewed on the completion of study (for example OU)?	
10	COMG4AB2	Are there adequate resources available for compensation activities? Are there different types of rewards and incentives possible within Softwarehouse?	
11	COAG4CO1	Is there a documented policy within Softwarehouse for conducting its competency analysis activities?	The purpose of Competency Analysis is to identify the knowledge, skills, and process abilities required to perform the organization's business activities so that they may be developed and used as a basis for workforce practices.
12	COAG4CO2	Is there an organizational role that is responsible for coordinating competency analysis activities across the organization?	
13	COAG4AB4	Are there defined practices and procedures for incorporating/ mapping the acquired knowledge of the employees while performing competency analysis?	
14	COAG4ME2	Are measurements made and used to determine the quality of workforce competency description and information also reflects the acquired knowledge of the	

		employees?	
15	CODG4CO1	Does SWH establish and maintain a documented policy for conducting its Competency Development activities to develop the core competencies required to perform its business processes. Is/should the acquired knowledge through the OU be a part of it?	
16	CODG4AB1	Is there an individual(s) in SWH who is assigned the responsibility and authority for ensuring that Competency Development activities are performed?	
17	CODG4AB3	Are there adequate resources provided for performing the planned organization wide and unit specific competency development activities?	The purpose of Competency Development is to constantly enhance the capability of the workforce to perform their assigned tasks and responsibilities.
18	CODG4AB6	Are the practices and procedures for performing Competency Development in SWH defined and documented?	
19	CODG4ME2	Is the quality of competence development activities measured in SWH?	
20	CODG4VE2	Does executive management periodically review the Competency Development activities, status, and results; and resolves issues?	
21	CODG4VE3	Is the definition and use of data on competency development periodically audited for compliance with organizational policies?	
22	CDG3CO1	Does the documented policy for career development facilitate growth in the workforce competency after following a study program?	The purpose of Career Development is to ensure that individuals are provided opportunities to develop workforce competencies that enable them to achieve career objectives.
23	CDG3CO2	Is there an role in SWH that coordinates the career development activities across the organization?	
24	CDG3AB1	Does an organizational role ensure the participation of employees in career development activities?	
25	CDG3AB3	Are adequate resources provided for implementing career development activities?	
26	CDG3AB6	Are the practices and procedure for career development defined and documented?	
27	CDG3ME1	Is the performance of career development activities measured to determine their status?	
28	CDG3VE1	Is there a person responsible to ensure that career development activities are conducted according to documented policies, practices and procedures and addresses non compliance?	
29	CDG3VE2	Should the executive management periodically review the career development activities, their status and resolve issues if required?	
30	CBPG4CO1	Is there a policy to promote increased capability in the organization's workforce competencies	The purpose of Competency-Based Practices is to ensure that all workforce practices are based in part on developing the competencies of the workforce.

31	CBPG4AB1	Would it help to have an individual in Softwarehouse who is assigned the responsibility and authority to motivate employees to develop and apply workforce competencies in case it already does not exist	
32	CBG4VE2	Does the executive management periodically review the activities implementing competency based workforce practices and their result and resolve issues if required	
33	MG3CO1	Is there an established policy for conducting mentoring activities? Would it be a good idea to consider mentoring the people who have finished a course through the OU, to facilitate conversion of knowledge into practice	The purpose of Mentoring is to transfer the lessons of greater experience in a workforce competency to improve the capability of other individuals or workgroups.
34	MG3CO2	Would a role be required to coordinate mentoring activities across the organization?	
35	MG3AB3	How do you think people who act as mentors, should be provided with opportunities to develop the knowledge skills, process skills needed in the mentoring techniques and skills to perform the activities?	
36	MG3ME2	How can effectiveness of mentoring activity be measured in Softwarehouse?	
37	MG3VE1	Should there a responsible individual who verifies that mentoring activities are conducted according to the organization's documented policies, practices, procedures and where appropriate addresses non compliance?	
38	KM1	Do you think that knowledge management systems can avoid reinventing of wheel across different geographical locations?	
39	KM2	Should there be an individual who should be responsible for and has the authority to facilitate transfer of knowledge for example through a knowledge management system?	
40	KM4	How can the performance of knowledge transfer activities be measured in Softwarehouse?	

Appendix C Questionnaire for survey

This survey is being undertaken in consideration of the research on the topic ' Transformation of individual academic knowledge into a competent organization, A case study in a software house'. Through the help of this survey it will be analyzed how "People Capability Maturity Model" can be utilized to facilitate transformation of individual academic knowledge, for example that being followed through Open University(OU) to a competent organization (Softwarehouse). If you are not following a study with the OU try to fill the survey from the perspective of a colleague who is following it or how you would have filled if you would have followed a course with the OU. This survey is anonymous.

Put a 'X' sign on the answer that you think is most suitable. Do not hesitate in adding remarks if required

Location is your work location for example Odijk

Age is optional

Location					
Function					
Age					
Are you following a study at OU					
		Yes	**No**	**Do Not Know**	**Remarks**
WEG1P2	Are the employees provided with the physical work environment (arbo conditions) that facilitates the usage of the acquired knowledge (e.g. through OU)				
PRMG1P1	Are there measurable performance objectives based on committed work that can be related to the study at OU				
PRMG4P14	Do you think recognition or reward at an appropriate basis at the end of successful completion of a study (e.g. OU) would motivate you to study further				
TDG2P7	Are there relevant development opportunities that can help you put acquired knowledge into use				
TDG2P81	Does your unique knowledge of a legacy system hinders your development				
TDG2P82	Do you think a knowledge management system could facilitate spread of unique functional or technical knowledge				
COMG1P2	Do you think that extra raise in salary (compensation) should be considered on completion of the OU study				
CODG1P3	Are you aware of development and work opportunities related to enhanced work force competencies (e.g. through OU)				
CODG2P5	Do you think that through the OU individuals are enhancing the competency level of the organization (SWH)				

CODG3P72	Do you think knowledge management systems within the competency communities(competence centres) can facilitate increasing your capabilities				
CODG3P8	Do you think that competency based experience and information about individuals would facilitate putting acquired knowledge to practice				
CDG1P1	Do you think that the career opportunities in your company (SWH) facilitate growth in the workforce competencies after following a study program				
CDG2P3	Do you think that the promotion criteria should be reviewed in the light of the OU track				
CDG2P6	Do you think offer of career options can facilitate conversion of acquired knowledge into practice				
CBPG2P5	Are your work assignments designed to enhance personal and career development objectives				
CBPG2P7	Do you think that de individual performance objectives that will be achieved through the OU will increase the capability of the workforce				
CBPG2P8	Do you think application of acquired knowledge / competencies should be a part of ongoing discussion on work performance				
CBPG3P12	Should development of competencies be a criteria for adjustments to compensation, after a study has been followed (eg. OU)				
MG1P8	Do you think mentoring can support the development and improvement of competencies acquired through the OU study				
MG2P6	Do you think that mentors assist individuals or workgroups in developing acquired capabilities (e.g. OU study)				
KM2	Do you think socialization - where individuals acquire knowledge directly from others is a good way of transferring acquired knowledge				
KM3	Do you think learning by doing is the best way to practice and retain acquired knowledge				
KM4	Is financial reward, incentive or recognition an incentive for you to share your acquired knowledge				
GEN1	Do you think that OU study is facilitated by Softwarehouse				